

**Air-condensed water chillers
and heat pumps
YCSA/YCSA-H 50, 60, 80, 100 T and TP
(R-407C)**



Ref.: Y-R70103 0607

Technical Information



Johnson Controls Manufacturing España, S.L. is participating in the EUROVENT Certification Program.

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The LCP program covers air condensed water chillers and heat pumps of up to 600 kW.

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General Information

General description

The YCSA/YCSA-H 50, 60, 80 and 100 units are high-performance air-water water chillers and heat pumps using R-407C ecological refrigerant.

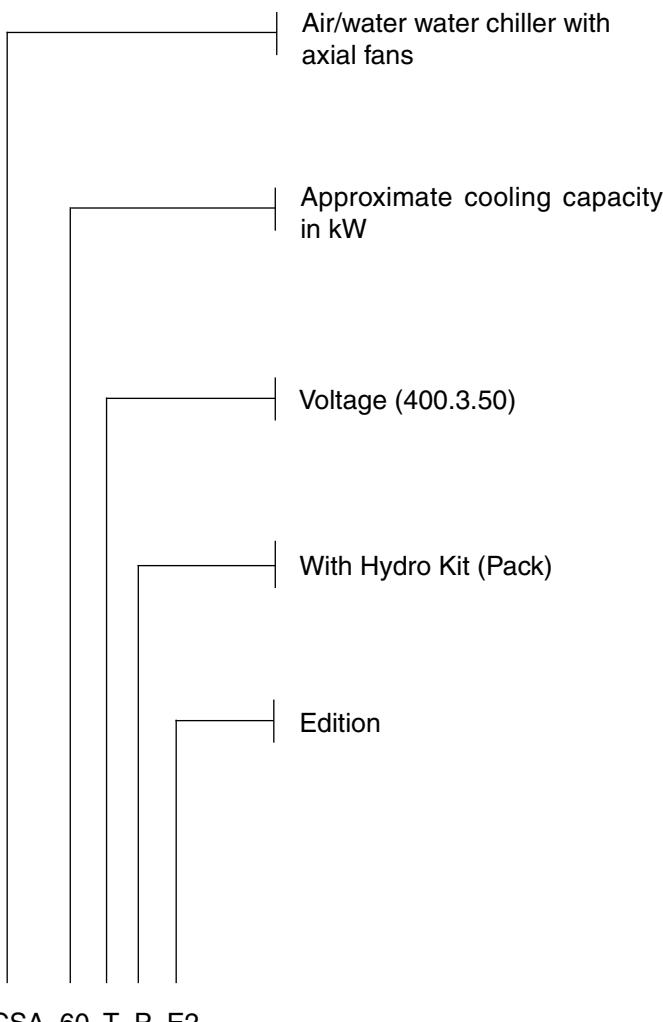
These units are designed for air conditioning or industrial applications that require cold or hot water. They are silent and compact units, equipped with vertical air discharge axial fans, that can be installed directly outdoors. They are available in two Versions: with and without a Hydro Kit, which includes a buffer tank and a high head pressure pump.

The control system of these units is a specially programmed electronic controller to be used on air-water water chillers and heat pumps equipped with tandem compressors.

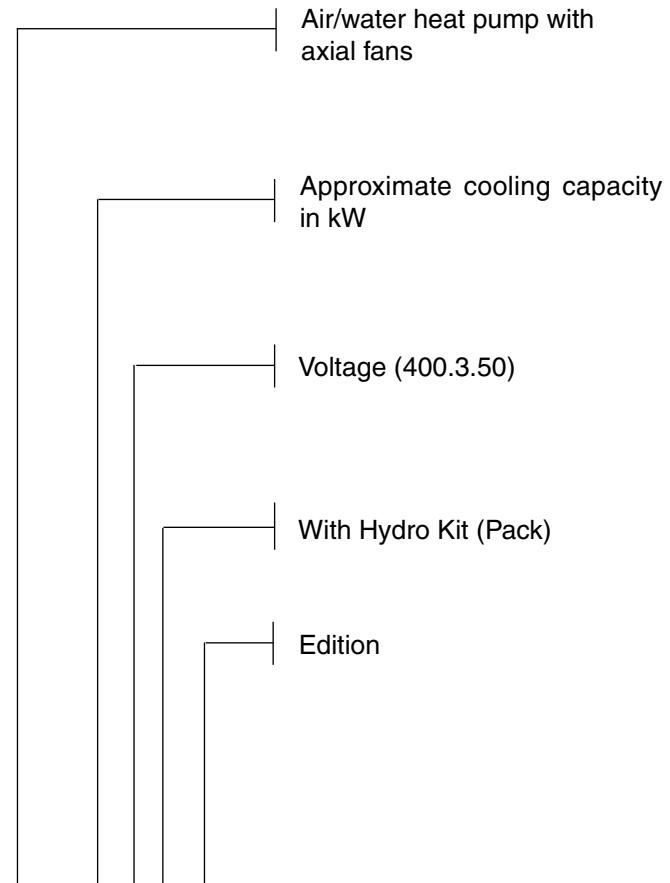
Easy to use and safe, these units precision control the water return temperature of the installation, carry out defrost cycles, modulate fan speeds and control compressor, pump and electric heater start-ups. By reading the control probes and safety elements, the controller protects the entire equipment against malfunctions. The system allows connecting the unit to a standard RS485 monitoring network. For further information, please see Operating Instructions.

The YCSA/YCSA-H 50, 60, 80 and 100 units are made of proven quality components and manufactured in compliance with standards in force (ISO 9001 certification).

Nomenclature



Nomenclature



Models available and capacities

Cool only model	YCSA 50	YCSA 60	YCSA 80	YCSA 100
Cooling capacity	49.2	61.2	78.6	96

Heat pump model	YCSA-H 50	YCSA-H 60	YCSA-H 80	YCSA-H 100
Cooling capacity	45.4	65.3	74.3	90
Heating capacity	54.4	62.5	81.2	101

Cooling capacities in kW for 12/7° C entering/leaving water temperature, and 35° C ambient temperature.

Heating capacities in kW for 40/45° C entering/leaving water temperature, and 7° C ambient temperature.

Features and advantages

Features	Advantages
R-407C refrigerant	Does not harm the ozone layer
Minimum dimensions	Minimum footprint
Low height and weight	Space for installing on terraces
Factory tested equipment	Operating quality control
Accessibility	Easy maintenance
Main switch	Operator safety
Microprocessor for control and alarms	Easy and safe operation
Manufactured to ISO 9001	High quality level
Variable speed fan	Low noise level and condensation control
Hydro Kit	For installations with a low water volume
Communications connection	Ideal for building management

Technical Specifications

These units are supplied completely factory-assembled and with all refrigerant tubing and wiring ready for installation on the job site.

After mounting, these units must go through an operational test with water. Refrigerant leaks will also be checked during this process.

Sheeting casing

The units are made of galvanized steel sheeting and anticorrosion nuts and bolts. Panels can be removed for access to internal components.

The casing parts are painted with white RAL9001 oven-baked polymerized enamel.

Compressors

Two hermetic Scroll compressors mounted in tandem on rails and antivibratory supports are used. Both compressors are connected for operation with one single cooling circuit. Start-up is carried out by two independent starters.

These compressors are equipped with electronic modules that protect them against high operating temperatures. The sump heaters operate only when the compressor is inoperative.

Indoor heat exchanger

Comprises a stainless steel plate exchanger, adequately insulated by a layer of closed-cell elastomer foam. Includes an antifreeze heater monitored by the controller and a differential pressure switch acting as a flow control switch. The refrigerant side of said exchanger accepts an operating pressure of 30 bar, whereas the water side accepts 10 bar. When the unit includes a Hydro Kit, maximum admissible pressure on the water side is 6 bar (adjustment of the tank relief valve).

Outdoor heat exchanger

Made up of two notched aluminium fin coils and grooved copper tubing mechanically expanded within the fin assembly.

Fans

Of the axial and low sound level type. Equipped with single-phase motors with IP54 protection. These motors allow speed control by means of a phase cut-out shifter controlled by the unit controller. This allows unit operation at low ambient temperatures (-10°C).

On cool only units, an optional low ambient temperature kit can reach -18°C. On heat pumps, the fan will remain inoperative during defrosts.

Electric and control panel

Located at the front of the unit, and with IP44 protection. The operating and control components are factory mounted, wired and tested.

The door of this control panel is equipped with a locking isolator that turns power supply off. Inside we find the contactors for compressors and the pump, the transformer, magneto-thermal protectors, controller electronic plates, speed control, connecting strip and the keyboard-display with the unit controls.

Control keyboard-display

This device is accessible through an external leak-tight plastic cover. This is an easy-to-use control with three access levels: Direct, User (password) and Factory (password). For further information, please see Operating Instructions.

Cooling circuit

The cool only unit cooling circuit includes: expansion valve, filter-dryer, liquid sight glass, high and low pressure switches, service valves for isolating the condensing unit, and Schrader valves on the high and low sides.

The heat pump model also includes the four-way valve (powered in the summer cycle and during defrosts), the check valve and a liquid tank. The suction tubing is coated with closed-cell elastomer.

Hydro Kit (Pack)

These units include a Pack assembled with the components of a Hydro Kit. This assembly is located within the unit frame and does not increase the footprint of same. It includes the

following components: Lined buffer tank with an antifreeze heater, centrifugal pump, expansion vessel charged with nitrogen at 1.5 bar, relief valve set to 6 bar, water circuit pressure gauge, two air bleed valves, filling valve and drain valve. Also includes a mesh filter for the water circuit.

This filter is supplied loose for installation at the most convenient point.

Protecting grids

To protect the coils from possible impacts. Made of steel sheeting and painted with oven baked polymerized white enamel (RAL9001).

Accessories and options

Unit without Hydro Kit

Includes the elements described in the previously mentioned specifications, less the Hydro Kit (Pack). The water circuit includes an air bleed valve. Connections are ready for field installation.

Dual pump

Accessory available on models YCSA-80 and 100 with hydro kit. The second pump starts upon activation of the heat switch of the first pump.

Flow switch

For field installation. Insures sufficient water circulation when the unit is in operation.

Anticorrosion protection of fins

Two options are available:

- Aluminium fins with Blue Fin primer.
- Copper fins.

Water filter (2" and 2 1/2")

Supplied as a standard element on units including the Hydro Kit (Pack).

Stainless steel screen with 1 mm. diameter perforations.

Optional on units not including the Pack.

The warranty of the unit will not be valid if a water filter has not been installed.

Remote control unit

Wall-mounted remote control unit with keyboard for cool/heat and ON/OFF functions. Includes power supply, alarm and cool/heat LEDs. Maximum cable length: 50 m.

Remote terminal

For total access and control of the system by means of the display and buttons. Allows selecting cool, heat and off functions. Can also modify operating parameters and monitor the system. Can be installed at a maximum distance of 1040 m.

BMS connections

By means of a serial board, it is possible to connect the system to a standard RS485 monitoring network.

Low ambient temperature kit

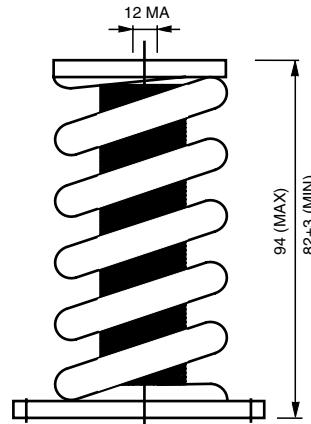
Includes two pressure transducers for controlling condensing pressure at low ambient temperature (-18°C). Available for cool only units only.

Low noise level (LN) units

These include anti-noise casings mounted on the compressors and sound insulation lining the panels of the compressor chamber.

Antivibratory supports

Whenever necessary to reduce to a maximum vibrations and noise caused by the unit, you can use a set of steel spring antivibratory supports, that should be installed between the supporting chassis of the unit and the base or floor on which same should be set. This base should be solid and dimensioned in accordance with the weight to be supported. To fasten the supports to the base of the chassis, 12 Ma screws are used. The antivibratory supports accessory for the YCSA/YCSA-H 50/60 includes 4 springs, where as for the YCSA/YCSA-H 80/100 includes 6. These spring supports should be distributed amongst and fastened in the drilled holes in the base, the location of which is detailed in the General Dimensions section.



Physical data, cool only units

Characteristics		YCSA-50T and TP	YCSA-60T and TP	YCSA-80T and TP	YCSA-100T and TP
Cooling capacity	kW	49.2	61.2	78.6	96
Capacity control	%		50/100		
Power supply	V/ph		400/3.50		
Compressor consumption	kW	2 x 8.6	2 x 11.3	2 x 12.8	2 x 18.1
Compressor intensity	A	2 x 16.5	2 x 19.5	2 x 23.5	2 x 33
No. of refrigerant circuits			1		
No. of compressors			1 TANDEM		
Compressor type			SCROLL		
Oil charge	l		8.1		9.4
Oil type			POLYOL ESTER OIL		
Evaporating unit type			PLATES		
Nominal water flow	l/h	8 470	10 530	13 520	16 510
No. of fans		2		3	
Fan diameter	mm		630		710
Fan consumption	W	2 x 365	2 x 575	3 x 575	3 x 830
Fan intensity	A	2 x 1.8	2 x 2.6	3 x 2.6	3 x 3.35
Total air flow	m³/h	14 000	17 000	21 000	32 000
Refrigerant type			R-407C		
Refrigerant charge	kg	18	22	33	55
Sound power (STD) / (LN)	dB (A)	84 / 78	85 / 79	88 / 83	89 / 83
Sound pressure at 5 m / 5 m	dB (A)	62 / 56	63 / 57	66 / 61	67 / 61
Sound pressure at 10 m / 10 m	dB (A)	56 / 50	57 / 51	60 / 55	61 / 55
Dimensions					
Length	mm		2 103	2 943	3 336
Width	mm		1 004	1 108	1 140
Height	mm		1 398	1 400	1 582
Water connection, female			2"		
Water filter			2"		2 1/2"

Units with Hydro Kit (Version P)

No. of pumps			1		
Available static pressure at nominal flow (without filter) (2)	kPa	200	260	223	274
Available static pressure at nominal flow (with filter) (3)	kPa	190	240	165	241
Pump consumption	W	1 350	1 850	2 200	3 120
Pump intensity	A	2.9	3.4	4.3	5.4
Unit water content	l	179	181	274	278
Expansion vessel volume	l	12	18		25
Tank capacity	l	170		260	
Relief valve setting	Bar		6		
Max. unit power supply consump.	kW	24.3	32.3	38.3	53.9
Max. unit current intensity	A	46.4	57.7	71	91.5
Start-up current (compressor)	A	127	167	198	225
Weight (1)	kg	624	706	870	1 030

Units without Pack

Start-up current (compressor)	A	127	167	198	225
Water circuit pressure drop	kPa	30	42	59	33
Max. unit power supply consump.	kW	22.9	30.4	36.1	50.8
Max. unit current intensity	A	43.5	54.3	66.7	86.1
Weight (1)	kg	568	650	798	964

(1) Weight for unit empty. (2) Available static pressure, Eurovent certified. (3) Pressure with clean filter.

Physical data, heat pump units

Characteristics		YCSA-H 50 T and TP	YCSA-H 60 T and TP	YCSA-H 80 T and TP	YCSA-H 100 T and TP
Cooling capacity	kW	45.4	65.3	74.3	90
Heating capacity	kW	54.4	62.5	81.2	101
Capacity control	%		50/100		
Power supply	V/ph		400.3.50		
Compressor consumption in cooling	kW	2 x 8.72	2 x 10.65	2 x 13.2	2 x 17.6
Compressor consumption in heating	kW	2 x 9	2 x 10.3	2 x 13.9	2 x 16.9
Compressor intensity in cooling	A	2 x 15.5	2 x 17.7	2 x 23.8	2 x 30
Compressor intensity in heating	A	2 x 16	2 x 17.5	2 x 24.6	2 x 29.3
No. of refrigerant circuits			1		
No. of compressors			1 TANDEM		
Compressor type			SCROLL		
Oil charge in litres	l		8.1		9.4
Oil type			POLYOL ESTER OIL		
Evaporating unit type			PLATES		
Nominal flow	l/h	7 810	11 230	12 780	15 480
No. of fans		2		3	
Fan diameter			630		710
Total fan consumption	mm	2 x 365	2 x 575	3 x 575	3 x 830
Total fan intensity	W	2 x 1.8	2 x 2.6	3 x 2.6	3 x 3.35
Total air flow	A	14 000	17 000	21 000	32 000
Refrigerant type	m ³ /h		R-407C		
Refrigerant charge	kg	15.5	23	33	51
Sound power (STD) / (LN)	dB (A)	84 / 78	85 / 79	88 / 83	89 / 83
Sound pressure at 5 m / 5 m	dB (A)	62 / 56	63 / 57	66 / 61	67 / 61
Sound pressure at 10 m / 10 m	dB (A)	56 / 50	57 / 51	60 / 55	61 / 55
Dimensions					
Length	mm	2 103		2 943	3 336
Width	mm	1 004		1 108	1 140
Height	mm	1 398		1 400	1 582
Water connections, female			2"		
Water filter, female			2"		2 1/2"

Units with Hydro Kit (Version P)

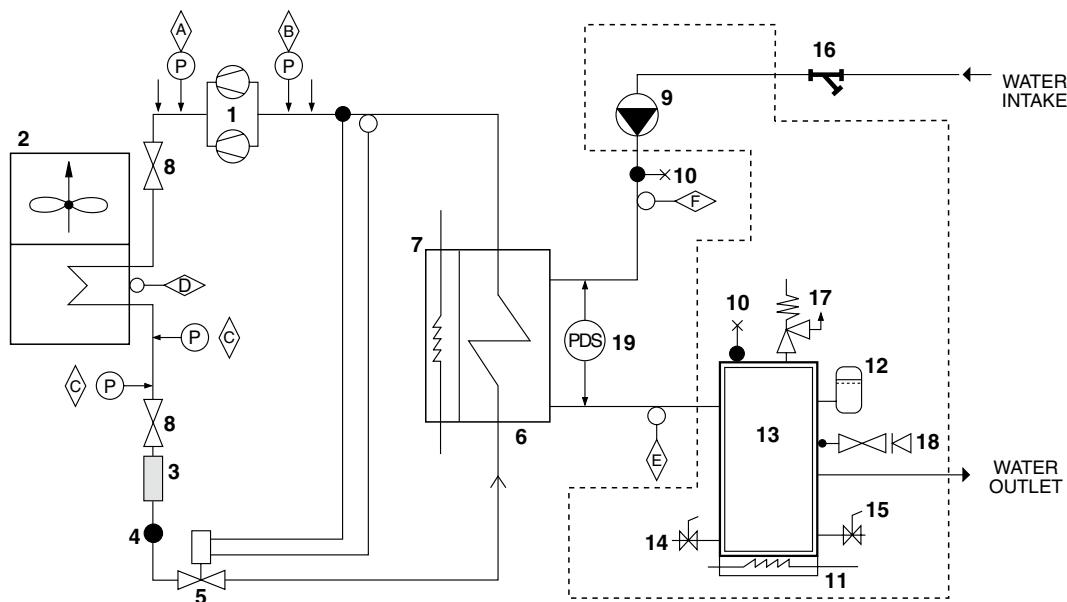
No. of pumps		1			
Available static pressure at rated flow (without filter) (2)	kPa	216	230	234	295
Available static pressure at rated flow (with filter) (3)	kPa	208	204	194	294
Pump consumption	W	1 350	1 850	2 200	3 120
Pump intensity	A	2.9	3.4	4.3	5.4
Unit water content	l	179	181	274	278
Expansion vessel volume	l	12	18		25
Tank capacity	l	170		260	
Relief valve setting	Bar	6			
Max. unit power supply consumption	kW	24.3	32.3	38.3	53.9
Max. unit current intensity	A	46.4	57.7	71	91.5
Start-up current (compressor)	A	127	167	198	225
Weight (1)	kg	636	720	890	1 065

Units without Pack

Start-up current (compressor)	A	127	167	198	225
Cool mode pressure drop	kPa	26	48	54	29
Max. unit power supply consumption	kW	22.9	30.4	36.1	50.8
Max. current intensity	A	43.5	54.3	66.7	86.1
Weight (1)	kg	580	664	824	1 000

(1) Weight for unit empty. (2) Available static pressure, Eurovent certified. (3) Pressure with clean filter.

Operation, cooling and hydraulic diagram, cool only unit



SAFETY/CONTROL DEVICES

- A High pressure switch
- B Low pressure switch
- C Pressure transducer port (2)
- D Condensing unit temp. sensor (fan speed setting and display)
- E Water outlet temperature sensor (antifreeze and display)
- F Water intake temperature sensor (setting and display)

COMPONENTS

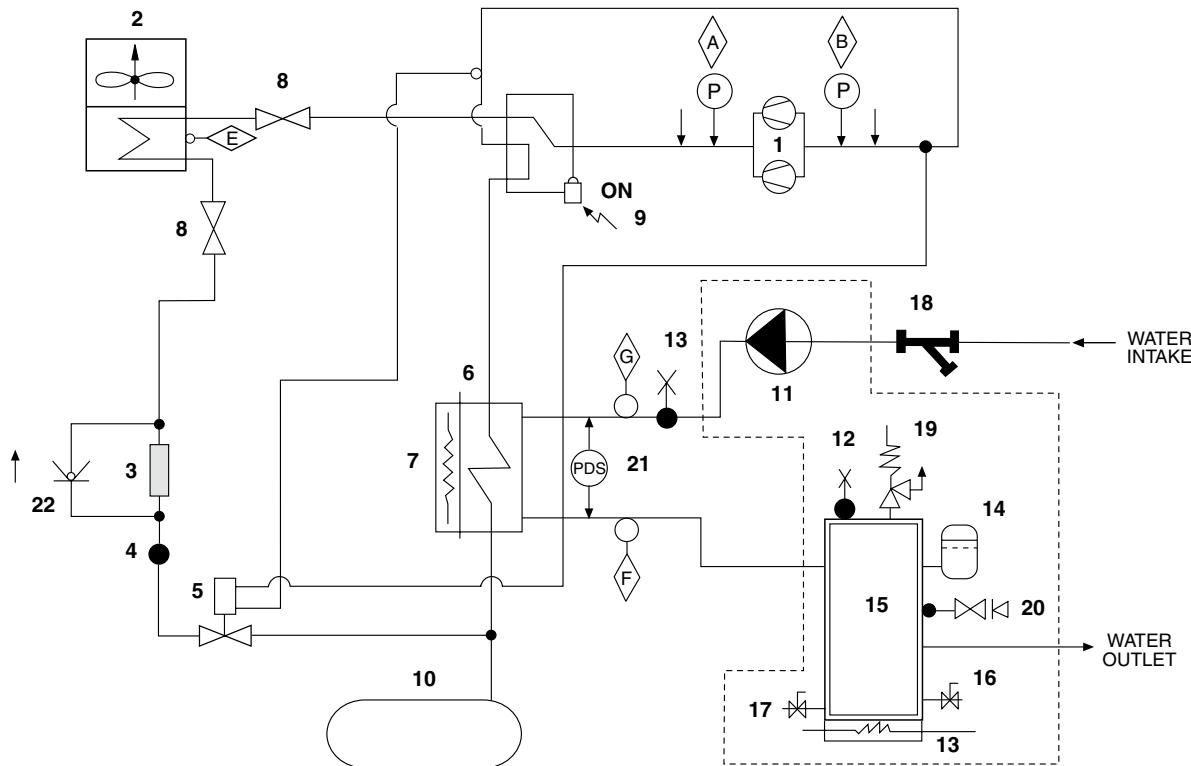
- 1 Tandem compressor
- 2 Air cooled condenser
- 3 Filter dryer
- 4 Sight glass
- 5 Expansion valve
- 6 Plate heat exchanger
- 7 Exchanger antifreeze heater
- 8 Globe valve
- 9 Water pump
- 10 Automatic air bleed
- 11 Water tank antifreeze heater
- 12 Expansion vessel
- 13 Water tank
- 14 Charge valve
- 15 Drain valve
- 16 Water filter (outside the unit)
- 17 Relief valve
- 18 Pressure gauge
- 19 Pressure differential switch

→ Pipe connection with Schrader valve
----- For units with Hydro Kit only

Heat exchange takes place between the heat transfer liquid (water or glycol water) and the refrigerant in the plate heat exchanger. Water is cooled, and refrigerant is evaporated and reheated. Then the Scroll compressor condenses the refrigerant (gas) until the condensing pressure is reached, and the refrigerant goes to the air cooled condensing unit. In the air cooled condensing unit, heat is exchanged between

the air and the refrigerant. The air is heated and evacuated from the chiller (heat rejection). The refrigerant is condensed and sub-cooled. Then the refrigerant (liquid) goes on to the expansion valve, where it is expanded until the evaporating pressure is reached, at which time it goes to the evaporating unit to start a new cooling cycle.

Operation, cooling and hydraulic diagram, heat pump unit



SAFETY/CONTROL DEVICES

- A** High pressure switch
- B** Low pressure switch
- E** Condensing unit temperature sensors (2) (fan speed setting, defrosts and display)
- F** Water outlet temperature sensor (antifreeze and display)
- G** Water intake temperature sensor (setting and display)

COMPONENTS

- 1** Tandem compressor
- 2** Air cooled condenser
- 3** Filter dryer
- 4** Sight glass
- 5** Expansion valve
- 6** Plate heat exchanger
- 7** Exchanger antifreeze heater
- 8** Globe valve
- 9** 4-way valve
- 10** Liquid receiver

11 Water pump

- 12** Automatic air bleed
- 13** Water tank antifreeze heater
- 14** Expansion vessel
- 15** Water tank
- 16** Charge valve
- 17** Drain valve
- 18** Water filter (outside the unit)
- 19** Relief valve
- 20** Water pressure gauge
- 21** Pressure differential switch
- 22** Check valve

→ Pipe connection with Schrader valve
----- For units with Hydro Kit only

Cooling cycle

The 4-way valve is activated. Heat exchange takes place between the heat transfer liquid (water or glycol water) and the refrigerant in the plate heat exchanger. Water is cooled, and refrigerant is evaporated and reheated. Then the Scroll type compressor condenses the refrigerant (gas) until the condensing pressure is reached, and the refrigerant goes to the air cooled condensing unit. In the air cooled condensing unit, heat is exchanged between the air and the refrigerant. The air is heated and evacuated from the chiller (heat rejection). The refrigerant is condensed and sub-cooled. Then the

refrigerant (liquid) goes on to the expansion valve, where it is expanded until the evaporating pressure is reached, at which time it goes to the evaporating unit to start a new cooling cycle.

Heating cycle

The cycle is reversed to heating mode. The 4-way valve is not activated. The condensing unit becomes the evaporating unit, and the evaporating unit becomes the condensing unit. The water in the heat exchanger is heated.

Table 1. Cooling capacities YCSA 50-100

Model YCSA	Leaving water temp. °C	Outdoor ambient temperature °C DB (80% RH)													
		25		30		32		35		40		43		45	
		Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit
50	5	52.4	15.3	48.7	16.5	47.7	17.1	46.7	18	42.3	19.2	40.3	20.4	37.4	21.1
	6	53.5	15.5	50.7	16.8	49.5	17.3	47.7	18.2	43.7	19.6	41.4	20.7	39.4	21.4
	7	55.2	15.7	52.3	17	51	17.5	49.2	18.4	45.1	19.9	42.6	20.9	41.3	21.6
	8	56.4	16	53.5	17.3	52.2	17.8	50.3	18.7	46.1	20.3	43.6	21.3	42.6	22
	10	58.8	16.6	55.8	18	54.5	18.5	52.5	19.4	48.2	21	45.6	22		
	12	61.3	17.3	58.1	18.7	56.7	19.3	54.7	20.2	50.2	21.8				
	15	64.8	18.4	61.4	19.8	60	20.4	57.9	21.3						
60	5	65.2	19.8	60.6	21.3	59.4	22.1	58.1	23.3	52.6	24.9	50.2	26.5	46.5	27.4
	6	66.6	20	63	21.7	61.6	22.4	59.3	23.5	54.4	25.3	51.4	26.9	49	27.7
	7	68.6	20.2	65	21.9	63.5	22.6	61.2	23.8	56.1	25.8	53	27.1	51.4	28
	8	70.1	20.7	66.5	22.4	64.9	23.1	62.6	24.2	57.4	26.3	54.2	27.6	52.9	28.5
	10	73.2	21.5	69.4	23.3	67.8	24	65.4	25.2	59.9	27.3	56.7	28.6		
	12	76.2	22.4	72.2	24.2	70.6	24.9	68.1	26.1	62.4	28.3				
	15	80.6	23.8	76.4	25.6	74.7	26.4	72.1	27.7						
80	5	83.7	22.7	77.8	24.4	76.2	25.3	74.7	26.7	67.6	28.5	64.5	30.3	59.7	31.3
	6	85.5	22.9	81	24.9	79.1	25.7	76.2	26.9	69.9	29	66.1	30.7	62.9	31.7
	7	88.1	23.2	83.5	25.1	81.5	25.9	78.6	27.2	72.1	29.5	68.1	31	66	32.1
	8	90.1	23.7	85.4	25.7	83.4	26.4	80.4	27.7	73.7	30.1	69.7	31.6	68	32.6
	10	94	24.6	89.1	26.6	87.1	27.5	83.9	28.8	77	31.2	72.8	32.7		
	12	97.9	25.6	92.8	27.7	90.6	28.5	87.4	29.9	80.2	32.4				
	15	103.6	27.2	98.2	29.3	95.9	30.2	92.6	31.6						
100	5	102.2	32.4	95	34.7	93.1	36	91.2	38	82.6	40.5	78.7	43	73	44.5
	6	104.4	32.7	98.9	35.4	96.6	36.6	93.1	38.3	85.3	41.2	80.7	43.7	76.8	45
	7	107.6	33.1	102	35.8	99.6	36.9	96	38.7	88	42	83.2	44.1	80.6	45.6
	8	110.4	33.7	104.3	36.5	101.8	37.6	98.2	39.4	90	42.8	85.1	44.9	83	46.3
	10	114.8	35.1	108.8	37.9	106.3	39.1	102.5	41	94	44.4	88.9	46.5		
	12	119.6	36.5	113.3	39.4	110.7	40.6	106.8	42.5	97.9	46				
	15	126.5	38.7	119.9	41.7	117.2	43	113	44.9						

Table 2. Cooling capacities YCSA 50-100 (35% ethylene glycol)

Model YCSA	Leaving water temp. °C	Outdoor ambient temperature °C DB (80% RH)													
		25		30		32		35		40		43		45	
		Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit
		KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW
50	-5	31.7	12.3	30	13.3	29.3	13.7	28.2	14.4	25.9	15.6	24.5	16.3	23.1	17.2
	-4	33.2	12.6	31.4	13.6	30.7	14	29.6	14.7	27.1	16	25.7	16.7	24.1	17.7
	-2	36.5	13.1	34.5	14.2	33.7	14.6	32.4	15.3	29.8	16.6	28.1	17.4	26.3	18.4
	0	39.9	13.7	37.7	14.8	36.8	15.2	35.5	16	32.5	17.3	30.8	18.2	28.5	19
	2	43.5	14.2	41.2	15.4	40.2	15.8	38.7	16.6	35.5	18.1	33.6	18.9	31.7	19.7
	4	47.2	14.8	44.6	16	43.6	16.5	42	17.3	38.5	18.8	36.5	19.7	34.4	20.8
60	-5	39.5	15.8	37.3	17.1	36.4	17.7	35.1	18.5	32.2	20.1	30.5	21.1	28.8	22.3
	-4	41.3	16.2	39.1	17.5	38.2	18.1	36.8	18.9	33.7	20.6	31.9	21.6	30	22.8
	-2	45.3	16.9	42.9	18.3	41.9	18.9	40.4	19.8	37	21.5	35	22.5	32.7	23.8
	0	49.6	17.6	46.9	19	45.8	19.6	44.1	20.6	40.5	22.4	38.3	23.5	35.5	24.7
	2	54.2	18.3	51.2	19.8	50.0	20.5	48.2	21.5	44.2	23.4	41.8	24.5	39.5	25.6
	4	58.7	19.1	55.5	20.6	54.2	21.3	52.3	22.3	47.9	24.3	45.3	25.5	42.8	26.9
80	-5	50.7	18.2	47.9	19.7	46.8	20.3	45.1	21.3	41.3	23.1	39.1	24.2	36.9	25.5
	-4	53.1	18.6	50.2	20.1	49	20.7	47.2	21.7	43.3	23.6	41	24.7	38.5	26.2
	-2	58.2	19.4	55.1	21	53.8	21.6	51.8	22.7	47.6	24.6	45	25.8	42.1	27.2
	0	63.7	20.2	60.2	21.9	58.8	22.5	56.6	23.6	52	25.7	49.1	26.9	45.6	28.2
	2	69.6	21.1	65.8	22.8	64.2	23.5	61.9	24.6	56.8	26.8	53.7	28.1	50.7	29.2
	4	75.4	21.9	71.3	23.7	69.7	24.4	67.1	25.6	61.6	27.8	58.2	29.2	55	30.8
100	-5	61.9	26	58.5	28.1	57.1	29	55	30.3	50.5	32.9	47.8	34.5	45.1	36.3
	-4	64.9	26.6	61.3	28.7	59.9	29.6	57.7	31	52.9	33.6	50.1	35.2	47	37.2
	-2	71.1	27.7	67.3	29.9	65.7	30.8	63.3	32.3	58.1	35	54.9	36.7	51.4	38.7
	0	77.8	28.8	73.6	31.1	71.8	32.1	69.2	33.6	63.5	36.6	60	38.3	55.7	40.1
	2	85	30	80.3	32.4	78.5	33.4	75.6	35	69.4	38.1	65.6	39.9	61.9	41.6
	4	92.1	31.2	87.1	33.7	85.1	34.7	82	36.4	75.2	39.6	71.1	41.5	67.2	43.8

Table 3. Correcting factors for other glycol concentrations

% in weight	Ethylene glycol			Propylene glycol		
	Capacity		Absorbed power	Capacity		Absorbed power
10	1.061		1.025	1.097		1.033
20	1.036		1.015	1.067		1.023
30	1.015		1.005	1.026		1.008
35	1		1	1		1
40	0.985		0.995	0.974		0.992
50	0.954		0.985	0.923		0.977

If it is necessary to make a selection with different glycol percentages, correct the capacity and absorbed power values in Table 2 (35% ethylene glycol), multiplying them by the coefficients indicated in Table 3.

Table 4. Cooling capacities YCSA-H 50-100

Model YCSA-H	Leaving water temp. °C	Outdoor ambient temperature °C DB (80% RH)													
		25		30		32		35		40		43		45	
		Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit
50	5	48.4	15.5	44.9	16.7	44	17.3	43.1	18.2	39	19.5	37.2	20.7	34.5	21.4
	6	49.4	15.7	46.8	17	45.7	17.6	44	18.4	40.4	19.8	38.2	21	36.3	21.6
	7	50.9	15.9	48.2	17.2	47.1	17.7	45.4	18.6	41.6	20.2	39.4	21.2	38.1	21.9
	8	52	16.2	49.3	17.5	48.2	18.1	46.4	18.9	42.6	20.6	40.2	21.6	39.3	22.3
	10	54.3	16.8	51.5	18.2	50.3	18.8	48.5	19.7	44.5	21.3	42	22.3		
	12	56.6	17.5	53.6	18.9	52.3	19.5	50.5	20.4	46.3	22.1				
	15	59.8	18.6	56.7	20	55.4	20.6	53.5	21.6						
60	5	69.5	18.7	64.6	20.1	63.3	20.9	62	22	56.2	23.5	53.5	25	49.6	25.9
	6	71	18.9	67.3	20.5	65.7	21.2	63.3	22.2	58	23.9	54.9	25.4	52.2	26.2
	7	73.2	19.1	69.4	20.7	67.7	21.4	65.3	22.5	59.9	24.4	56.6	25.6	54.9	26.5
	8	74.8	19.5	71	21.2	69.3	21.8	66.8	22.9	61.2	24.9	57.9	26.1	56.5	26.9
	10	78.1	20.3	74	22	72.3	22.7	69.7	23.8	63.9	25.8	60.5	27		
	12	81.3	21.1	77.1	22.8	75.3	23.6	72.6	24.7	66.6	26.8				
	15	86	22.5	81.6	24.2	79.7	25	76.9	26.1						
80	5	79.1	23.4	73.6	25.1	72.1	26	70.6	27.5	63.9	29.3	60.9	31.2	56.5	32.2
	6	80.8	23.6	76.5	25.6	74.8	26.4	72	27.7	66	29.8	62.5	31.6	59.4	32.6
	7	83.3	23.9	78.9	25.9	77.1	26.7	74.3	28	68.1	30.4	64.4	31.9	62.4	33
	8	85.2	24.4	80.7	26.4	78.8	27.2	76	28.5	69.7	31	65.8	32.5	64.3	33.5
	10	88.9	25.3	84.2	27.4	82.3	28.3	79.4	29.6	72.8	32.1	68.8	33.7		
	12	92.6	26.4	87.7	28.5	85.7	29.4	82.6	30.8	75.8	33.3				
	15	97.9	28	92.8	30.2	90.7	31.1	87.5	32.6						
100	5	95.9	31.5	89.1	33.8	87.3	35.1	85.5	37	77.4	39.5	73.8	41.9	68.4	43.3
	6	97.9	31.9	92.7	34.5	90.6	35.6	87.3	37.3	80	40.2	75.7	42.5	72	43.9
	7	100.9	32.2	95.6	34.9	93.3	36	90	37.7	82.5	40.9	78	42.9	75.6	44.4
	8	103.1	32.9	97.8	35.6	95.5	36.7	92	38.4	84.4	41.7	79.8	43.7	77.9	45.1
	10	107.7	34.2	102	36.9	99.7	38.1	96.1	39.9	88.1	43.2	83.3	45.3		
	12	112.1	35.5	106.2	38.3	103.8	39.6	100.1	41.4	91.8	44.8				
	15	118.6	37.7	112.4	40.6	109.8	41.8	106	43.8						

Table 5. Heating capacities YCSA-H 50-100

Model YCSA-H	Leaving water temp. °C	Outdoor ambient temperature °C DB (80% RH)													
		-10		-5		-3		0		5		7		10	
		Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit	Cap.	Unit
50	30	35.5	14.4	33.9	13.2	35.8	13.3	37.7	13.4	41.9	16.2	60.7	17.3	66.6	17.9
	35	34.0	14.8	33.0	14.1	34.9	14.2	36.7	14.3	40.8	16.9	58.8	17.9	64.5	18.7
	40	32.2	15.2	32.2	15.3	34.0	15.4	35.7	15.5	39.7	17.6	56.6	18.5	62.4	19.4
	45			31.3	17.1	33.0	17.2	34.8	17.3	38.6	18.3	54.4	19.3	60.1	20.2
	50							33.8	19.3	37.5	19.0	52.0	19.9	57.6	20.9
60	30	40.8	16.3	39.0	14.9	41.1	15.0	43.3	15.1	48.1	18.4	69.7	19.6	76.5	20.3
	35	39.1	16.8	38.0	15.9	40.1	16.0	42.2	16.1	46.9	19.2	67.5	20.3	74.1	21.2
	40	37.0	17.2	37.0	17.4	39.0	17.5	41.1	17.6	45.6	20.0	65.0	21.0	71.7	22.0
	45			35.9	19.4	37.9	19.5	39.9	19.6	44.4	20.7	62.5	21.9	69.1	22.9
	50							38.8	21.9	43.1	21.5	59.7	22.6	66.2	23.8
80	30	53.0	21.8	50.6	19.9	53.5	20.1	56.3	20.2	62.5	24.7	90.5	26.2	99.4	27.2
	35	50.8	22.5	49.3	21.3	52.1	21.5	54.8	21.6	60.9	25.7	87.7	27.2	96.3	28.4
	40	48.1	23.0	48.0	23.3	50.7	23.4	53.3	23.6	59.3	26.8	84.5	28.2	93.2	29.6
	45			46.7	26.1	49.3	26.2	51.9	26.3	57.7	27.8	81.2	29.4	89.8	30.7
	50							50.4	29.4	56.0	28.9	77.6	30.4	86.0	31.9
100	30	66.0	27.2	63.0	25.0	66.5	25.1	70.0	25.3	77.8	30.7	112.6	32.6	123.6	33.8
	35	63.2	28.0	61.4	26.6	64.8	26.8	68.2	27.0	75.8	32.0	109.1	33.8	119.8	35.2
	40	59.8	28.7	59.7	29.0	63.0	29.2	66.4	29.4	73.7	33.3	105.1	35.0	115.9	36.7
	45			58.1	32.4	61.3	32.6	64.5	32.7	71.7	34.5	101.0	36.5	111.6	38.1
	50							62.7	36.5	69.7	35.8	96.5	37.7	107.0	39.5

Integrated heating capacity, including defrost cycles. KW unit = Includes consumption of compressors and fans.

**Table 6. Available pressure for the hydraulic circuit, YCSA/YCSA-H 50-100 with kit
(With filter fitted)**

Model	Flow l/h	Kpa
YCSA/YCSA-H 50 TP	6 000	261
	6 500	249
	7 000	236
	7 500	223
	8 000	209
	8 500	197
	9 000	183
	9 500	168
	10 000	153
	10 500	138
	11 000	120
	11 500	103
	12 000	84
	12 500	68
	13 000	47
	7 500	359
	8 000	346
	8 500	331
	9 000	315
YCSA/YCSA-H 60 TP	9 500	297
	10 000	278
	10 500	259
	11 000	239
	11 500	215
	12 000	191
	12 500	165
	13 000	138
	13 500	106
	14 000	74
	10 000	272
	10 500	265
	11 000	258
	11 500	251
YCSA/YCSA-H 80 TP	12 000	245
	12 500	237
	13 000	228
	13 500	220
	14 000	212
	14 500	204
	15 000	192
	15 500	186
	16 000	177
	16 500	167
	17 000	157
	17 500	147
	18 000	138
	18 500	128
	19 000	118
	19 500	106
	20 000	94
	20 500	82
	21 000	70
YCSA/YCSA-H 100 TP	12 000	350
	13 000	336
	14 000	319
	15 000	302
	16 000	282
	17 000	260
	18 000	239
	19 000	215
	20 000	188
	21 000	158
	22 000	126
	23 000	91
	24 000	52

Data with water at 10°C.

In the case of the use of glycol, apply the correcting factors shown in Tables 2 and 3.

**Table 7. Pressure drop in the hydraulic circuit, YCSA/YCSA-H 80-100 without kit
(Without filter fitted)**

Model	Flow l/h	Kpa
YCSA/YCSA-H 50 T	5 500	12
	6 000	15
	6 500	18
	7 000	21
	7 500	24
	8 000	27
	8 500	30
	9 000	33
	9 500	36.5
	10 000	40
	10 500	44
	11 000	48
	11 500	52
	12 000	56
	12 500	60
	13 000	64
	13 500	68.5
	14 000	73
	7 500	22
YCSA/YCSA-H 60 T	8 000	25
	8 500	28.5
	9 000	32
	9 500	34.5
	10 000	37
	10 500	41.5
	11 000	46
	11 500	49.5
	12 000	53
	12 500	56.5
	13 000	60
	13 500	66
	14 000	72
	14 500	77.5
YCSA/YCSA-H 80 T	15 000	83
	15 500	88
	16 000	93
	16 500	98.5
	17 000	104
	17 500	113
	10 000	37
	11 000	43
	12 000	49
	13 000	55
	14 000	62
	15 000	68
	16 000	74
	17 000	81
YCSA/YCSA-H 100 T	18 000	89
	19 000	97
	20 000	105
	21 000	114
	22 000	124
	22 500	129
	12 000	19
	13 000	22
	14 000	25
	15 000	28
	16 000	31
	17 000	35
	18 000	39
	19 000	43

Table 8. Pressure drop filters

2" filter

Flow (l/h)	6 000	7 000	8 000	9 000	10 000	11 000	12 000	13 000	14 000	15 000	16 000	17 000	18 000	19 000	20 000
Kpa	0.5	0.8	1.1	1.4	1.7	2	2.3	2.6	2.9	3.3	3.7	4.1	4.6	5.1	6

2 1/2" filter

Flow (l/h)	15 000	16 000	17 000	18 000	19 000	20 000	21 000	22 000	23 000	24 000	25 000	26 000	27 000	28 000
Kpa	2	2.20	2.40	2.7	3	3.3	3.6	4	4.4	4.8	5.2	5.6	6	6.5
Flow (l/h)	29 000	30 000	31 000	32 000	33 000	34 000	35 000	36 000	37 000	38 000	39 000	40 000	41 000	42 000
Kpa	7	7.5	8	8.5	9	9.7	10.5	11.3	12.1	13	14	15	16	17

Data with water at 10°C. In the case of the use of glycol, apply the correcting factors shown in Tables 2 and 3.

Selection guide (YCSA and YCSA-H)

Necessary information

The following information is needed to select a YCSA water chiller:

1. Cooling capacity needed.
2. Design cold water input and output temperatures.
3. Design water flow, if any of the temperatures in above point 2 is unknown.
4. Design input temperature of air to air conditioning unit. Normally, this will be the design ambient temperature of summer air, unless influenced by the situation or other factors.
5. Altitude above sea level.
6. Design gumming coefficient of the evaporating unit.

Note: Points 1, 2 and 3 should be related by means of the following:

$$\text{Cooling capacity kW} = \frac{\text{l/h cold water} \times \text{°C differential}}{860}$$

Selection example

A chiller is required to chill water from 13°C to 7°C, with a cooling capacity 48 kW.

Here are other design conditions:

Ambient air entering the condensing unit	35°C
Gumming coefficient:	0.044 m ² °C/kW
Altitude:	At sea level

Table 9. Gumming coefficients

Evaporating unit		
Gumming coeff. m ² °C/kW	Capacity factor	Comp. absorbed power factor
0.044	1.000	1.000
0.088	0.987	0.995
0.176	0.964	0.985
0.352	0.926	0.962

Table 10. Altitude factors

Altitude (m)	Capacity factor	Comp. absorbed power factor
0	1.000	1.000
600	0.987	1.010
1 200	0.973	1.020
1 800	0.958	1.029
2 400	0.943	1.038

Taking a look at Table 1 we can see that YCSA-50, unit gives an approximate required capacity of 48 kW.

As the factors appearing in Table 9 and 10 are not applicable, conditions will be as follows:

Cooling capacity:	49.2 kW
Power consumed:	18.4 kW
Water temperature:	13°C a 7°C ($\Delta t = 6$)

$$\text{Water flow: } \frac{49.2 \times 860}{6} = 7 052 \text{ l/h}$$

Available pressure in hydraulic circuit of a unit with kit.

- From Table 6 we infer that the YCSA 50 TP, with a 7 052 l/h, flow, has an available pressure of 236 kPa.

Pressure drop in hydraulic circuit of a unit without kit.

- From Table 7 we infer that the YCSA 50 T, with a 7 052 l/h, flow, has a pressure drop of 21 kPa.

Pressure drop in filter.

- From Table 8, 2" filter, we infer that with a 7 050 l/h flow, said filter has a pressure drop of 6 kPa.

YCSA-H selection method

1. Determine the correct size of the YCSA-H unit by selecting a model from Tables 4 and 5 that is closest to the cooling and heating capacities required in the design conditions of the water outlet and air intake temperatures.
2. Apply gumming correcting factors (Table 9) and altitude (Table 10) to the capacity and power values that appear in the corresponding capacity tables in cool and heat. Make sure the corrected capacity is still sufficient for your needs.

3. Using the corrected capacities of the unit, select the design temperature differential, or the flow.
4. Check to make sure that these selections are within the YCSA/YCSA-H operating limits.

YCSA-H selection example

A YCSA-H heat pump operating at a 35°C, ambient temperature should chill water from 13°C to 7°C, with a 45 kW cooling capacity.

A 40 kW heating capacity is required in 0°C design ambient temperature and a hot water output temperature of 45°C.

The gumming coefficient is 0.044 m² °C/kW, with the unit operating at sea level (no corrections).

With a quick glance of capacity tables 4 and 5, we see that a YCSA-H 50 heat pump gives the approximate required capacities:

Cooling capacity	=	45.4 kW
Total unit absorbed power	=	18.6 kW
Cold water temperature	=	13°C a 7°C ($\Delta t = 6^\circ\text{C}$)
Hot and cold water flow	=	6 507 l/h
Heating capacity	=	42.4 kW
Total unit absorbed power in heat mode.	=	17.1 kW
Hot water output temperature	=	45°C
Hot water temp. differential	=	42.4×860
		$= 5.6^\circ\text{C}$
		$6 507$

Thus, hot water return

temperature is = 39.4°C

All valves are within operating limits.

- Available pressure in hydraulic circuit of a unit with kit.
 - From Table 6 we infer that the YCSA-H 50 TP, with a 6 507 l/h flow, has an available pressure of 250 kPa.
- Pressure drop in hydraulic circuit of a unit without kit.
 - From Table 7 we infer that the YCSA-H 50 T, with a 6 507 l/h flow, has a pressure drop of 18 kPa.
- Pressure drop in filter.
 - From Table 8, 2" filter, we infer that with a 6 507 l/h flow, said filter has a pressure drop of 5.5 kPa.

Selection guide with glycol (cool only units)

Necessary information

The following information is needed to select a YCSA water chiller:

1. Cooling capacity needed.
2. Design cold water/glycol input and output temperatures.
3. Design water/glycol flow.
4. Design input temperature of air to air conditioning unit. Normally, this will be the design ambient temperature of summer air, unless influenced by the situation or other factors.
5. Altitude above sea level.
6. Design gumming coefficient of the evaporating unit.

Note: Points 1, 2 and 3 should be related by means of the following formulae:

$$\Delta t (\text{°C}) \times \text{Flow (litres/second)}$$

$$\text{Cooling capacity (kW)} = \frac{\Delta t (\text{°C}) \times \text{Flow (litres/second)}}{\text{Glycol factor}}$$

In which Δt = liquid intake temp. - liquid output temp.

To determine the glycol factor, please see Figure 1 for ethylene glycol, or Figure 3 for propylene glycol. For design output temperature, please see the recommended glycol concentration and the glycol factor in this concentration. This is the minimum concentration to be used for design output temperature. If a greater concentration is required, the glycol factor can be determined by means of Figure 2 on ethylene glycol or Figure 4 on propylene glycol.

Selection method

1. Determine the correct size of chiller by selecting the one that is closest to the capacities required by the design conditions of the glycol outlet and air intake temperatures.
2. Apply the gumming correcting factors that correspond to the gumming coefficient, altitude and glycol concentration, and to the capacity tables. Make sure the corrected capacity is still sufficient for your needs.
3. Using the corrected capacities of the chiller, set the design temperature range, or the flow, to balance the formulae appearing in the "Necessary information" section.
4. Always recheck to make sure these selections are within the design operating limits.

Selection example

Achiller is required to chill ethylene glycol from 1 to -4°C with a capacity of 31 kW.

The following design conditions are applicable:

Gumming coefficient: 0.088m °C/kW

Altitude: 1 200m

Ambient air: 30°C

Concentration of glycol: 30% w/w

For a -4°C, ethylene glycol output, the concentration recommended in Figure 1 is 30%. Therefore, the specified concentration is appropriate.

From Table 2 (capacities with 35% glycol), we infor that a YCSA-50 unit, at the established design conditions, gives a capacity of 31.4 kW and a consumption of 13.6 kW.

With the desing gumming coefficient, use the capacity correcting factors x 0.987 and power x 0.995 (Table 9).

On design altitude, apply the capacity correcting factors x 9.973 and power x 1.020 (Table 10).

On design glycol concentration, apply the capacity correcting factors x 1.015 and power x 1.005 (Table 3).

Applying these factors to the selection: YCSA-50

$$\text{Capacity} = 31.4 \times 0.987 \times 0.973 \times 1.015 = 30.6 \text{ kW}$$

$$\text{Comp. power} = 13.6 \times 0.995 \times 1.020 \times 1.005 = 13.87 \text{ kW}$$

For the specified glycol conetcration and a -4°C output temperature, Figure 3 shows a 0.248 glycol factor. Thus, the flow can be determined with the formula appearing in the

"Necessary information" section.

$$30.6 \text{ kW} = \frac{(1 - (-4)) \times \text{Flow (l/s)}}{0.248}$$

$$\text{Flow} = \frac{30.6 \times 0.248}{5} = 1.51 \text{ (l/s) or } 5463 \text{ (l/h)}$$

This covers the limits of use.

The evaporating unit pressure drop can be determined by taking the water pressure drop value (Table 7) for a YCSA-50 unit and multiplying it by the correcting factor (see Fig. 5) for a 30% concentration and an average temperature of -1.5°C , that is to say, $1 + (-4) = -1.5$

$$\frac{2}{2} = 1.22$$

$$12 \text{ kPa} \times 1.22 = 14.64 \text{ kPa.}$$

Fig. 1 Recommended ethylene glycol concentrations

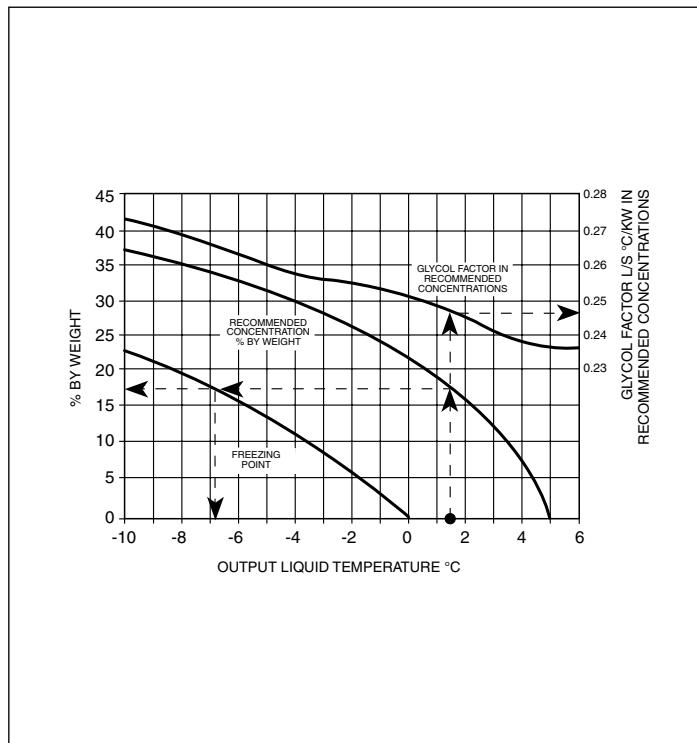


Fig. 3 Recommended propylene glycol concentrations

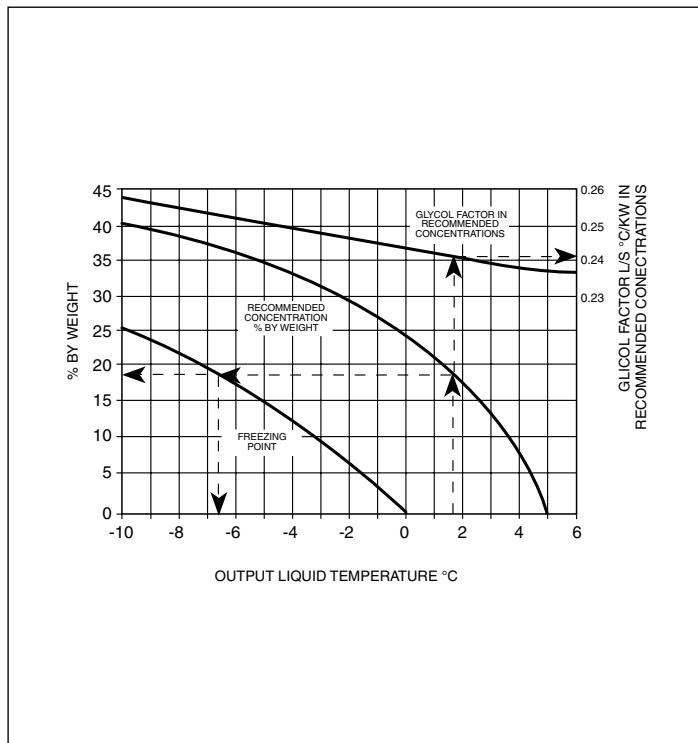


Fig. 2 Ethylene glycol in other concentrations

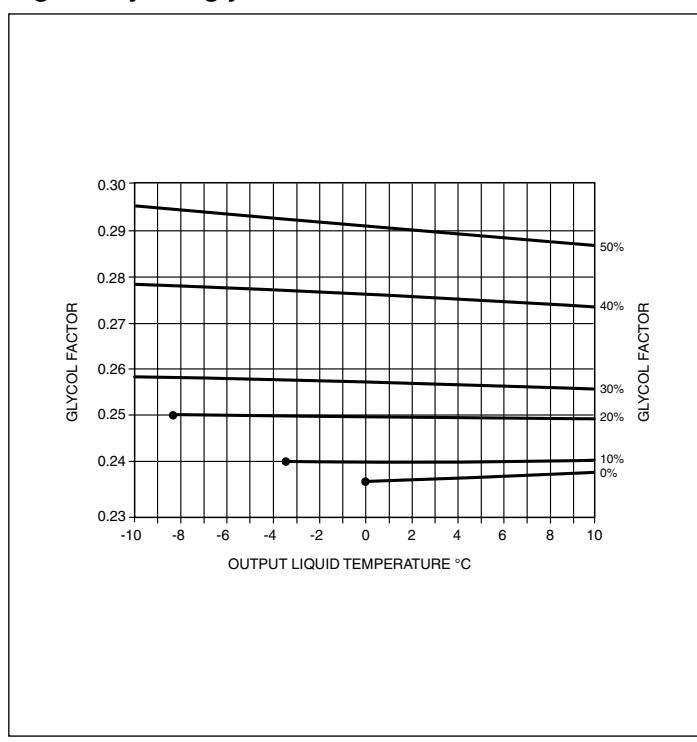


Fig. 4 Propylene glycol in other concentrations

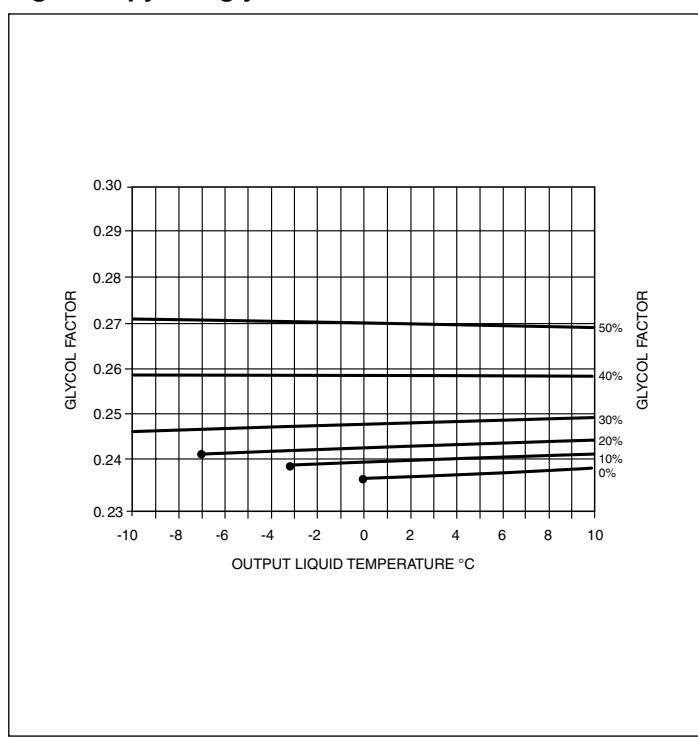
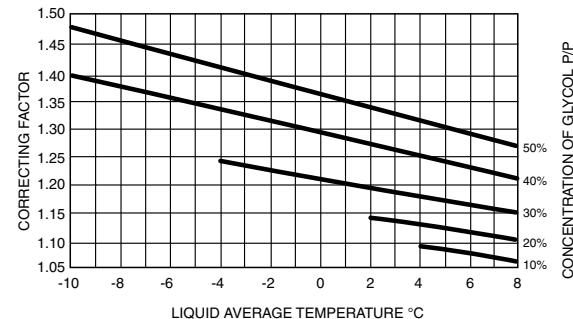
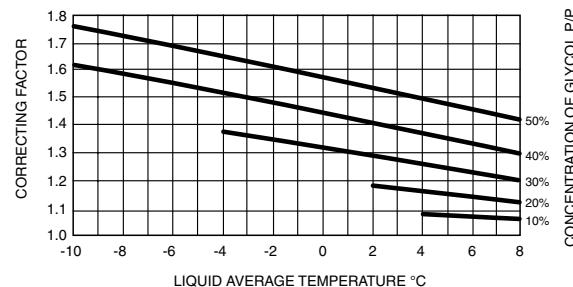


Fig. 5 Ethylene glycol pressure drop correcting factor

Fig. 6 Propylene glycol pressure drop correcting factor


Sound power spectrum

Standard units

Model Hz	125	250	500	1 000	2 000	4 000	8 000	dB(A)
YCSA/YCSA-H 50	76	80	81	76	71	63	58	84
YCSA/YCSA-H 60	77	81	83	78	73	64	59	85
YCSA/YCSA-H 80	78	82	83	81	73	64	59	88
YCSA/YCSA-H 100	79	84	84	82	77	65	60	89

Low noise level units

Model Hz	125	250	500	1 000	2 000	4 000	8 000	dB(A)
YCSA/YCSA-H 50	71	73	74	67	62	53	48	78
YCSA/YCSA-H 60	75	77	78	72	67	56	52	82
YCSA/YCSA-H 80	77	80	80	76	69	56	51	85
YCSA/YCSA-H 100	77	80	81	76	61	58	53	86

The data appearing in the tables are sound power values in compliance with the ISO EN 3743 standard.

Installation Instructions

Inspection

Upon reception, inspect the merchandise and notify both the carrier and the insurance company, in writing, of any possible damage.

Environmental protection

Packing



Packing is made of recyclable material. Its eliminate should be carried out in accordance with the existing local regulations on selective collection of residual material.

Elimination of the unit

Upon disassembly of the unit, its components should be recuperated ecologically. The cooling circuit contains refrigerant which should be recovered and returned to the gas manufacturer for recycling.

Oil will remain in the sealed compressor and, therefore, it must be returned with its circuit sealed.

The air conditioning unit will be deposited in an area established by the local authorities, for its selective recuperation.

Safety

Installation and maintenance operations of this air conditioning system should be carried out only by qualified and expert personnel. Periodical maintenance operations, such as cleaning the coils and air filters, should be carried out so as to keep unit performance at an optimum.



CAUTION

This unit should be installed and used in accordance with:

- Low Voltage Electrotechnical Regulations.
- Safety Regulations for Cooling Plants and Installations.
- Regulations on Pressure Equipment.
- Basic Construction Standards.
- Local ordinances

Transportation

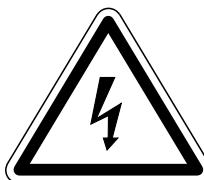
The units should always be transported in a vertical position so as to avoid oil leaking out of the compressor. If, for any reason, this position need be changed sporadically, they will remain in that position a strictly necessary period of time.

Handling

This unit should be handled by using the metal rails supplied for fastening and transportation.

Warning signs

The following signs indicate the presence of possible dangerous conditions for the users or maintenance personnel. When found on the unit, their meaning should be taken into account.



This symbol indicates an electrical risk or hazard.



Caution: The unit is equipped with a remote control system and can start automatically. Before having access to the interior of the unit, disconnect the power supply so as to avoid any contact with the fan turbine in motion.



Caution: Fan in operation.



Caution: It is obligatory to read the instructions prior to any handling.



Caution: Do not touch hot surfaces.



Attention: Possible gas leaks due to inadequate handling.

Location

Before locating the unit in place, check the specifications described on same to be sure you have received the adequate product.

The unit should be placed on a perfectly horizontal plane, making sure the base can support the weight of the unit.

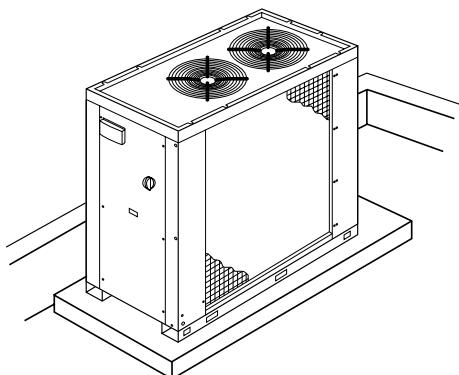
If you want to insure the absence of vibration, the unit can be placed on a cork or similar antivibratory base, or fastened to its base with antivibratory plates or supports.

Figure 11 indicates the clearances and fastening points for each model.

Fastening the unit

Before installing the unit, make sure the structure can withstand the weight of same.

If the unit is placed on the floor, a concrete base should be prepared so as to distribute its weight evenly. See Fig. 7.



Clearances

The installation of each unit should have clearances for:

- Air intake and discharge.
- Maintenance servicing.
- Power supply connection.

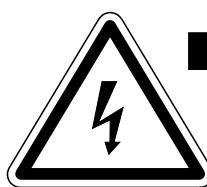
For correct operation, always respect the minimum distances indicated in the general dimensions diagrams with regard to possible obstructions of free air circulation or maintenance servicing.

Wiring

Electrical connections

The **established national regulations** should be followed in all cases.

Each unit is supplied with a control box to which the power supply will be connected through a fused main switch or an automatic switch.



WARNING

Loose cables can produce overheating of the terminals or an incorrect operation of the unit. A fire hazard may also exist. Therefore, make sure all cables are connected tightly.

Scroll compressors, rotational direction

The Scroll compressors operate correctly in one single rotational direction only. Although these units are protected by a phase sequence detector, when the machine is started up correct rotational direction should be checked.

If it is not correct:

- The compressor does not compress.
- It makes an unusual noise.
- Amp consumption is lower.
- It overheats.

Hydraulic connections

The hydraulic connections of the water intake and outlet of the chiller should be carried out respecting the intake and outlet directions indicated.

Galvanised iron or copper tubing can be used, with dimensions no lower than those indicated, and keeping in mind the pressure drops of said connections and of the internal exchanger of the installation.

Pump dimensioning should be carried out considering a nominal flow that allows an Δt within the operating limits.

In all cases, a flow switch should be installed so as to avoid the possibility of operation without water circulation.

An expansion vessel should be installed in the water return tubing.

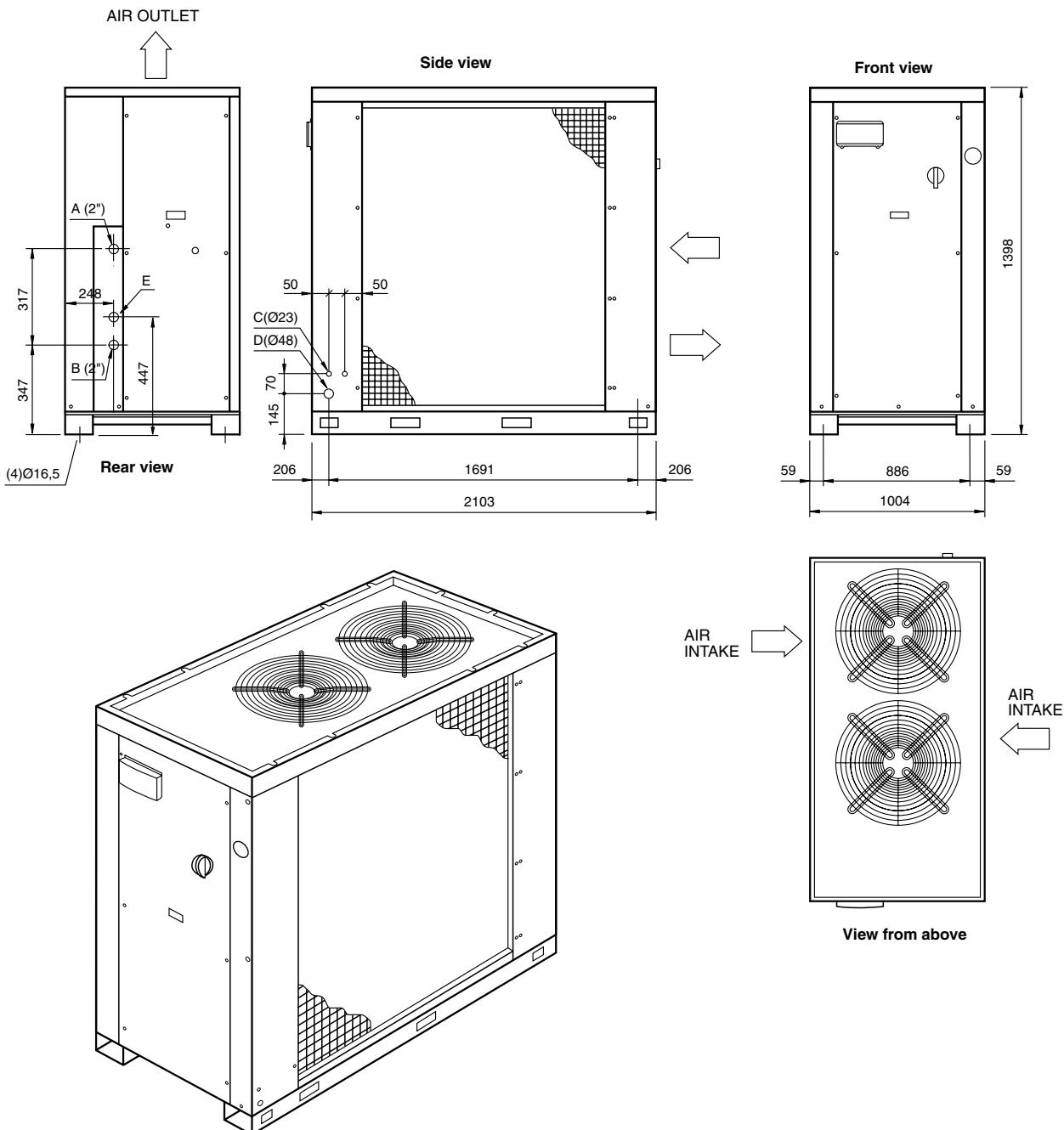
This vessel must be adequate for the total water volume of the installation.

During the winter season, with outdoor temperatures below 0°C, precautions should be taken to avoid the water from freezing in the tubing networks.

Usual application is to fill the circuit with an antifreeze mixture (glycol).

Dimensions and hydraulic connections

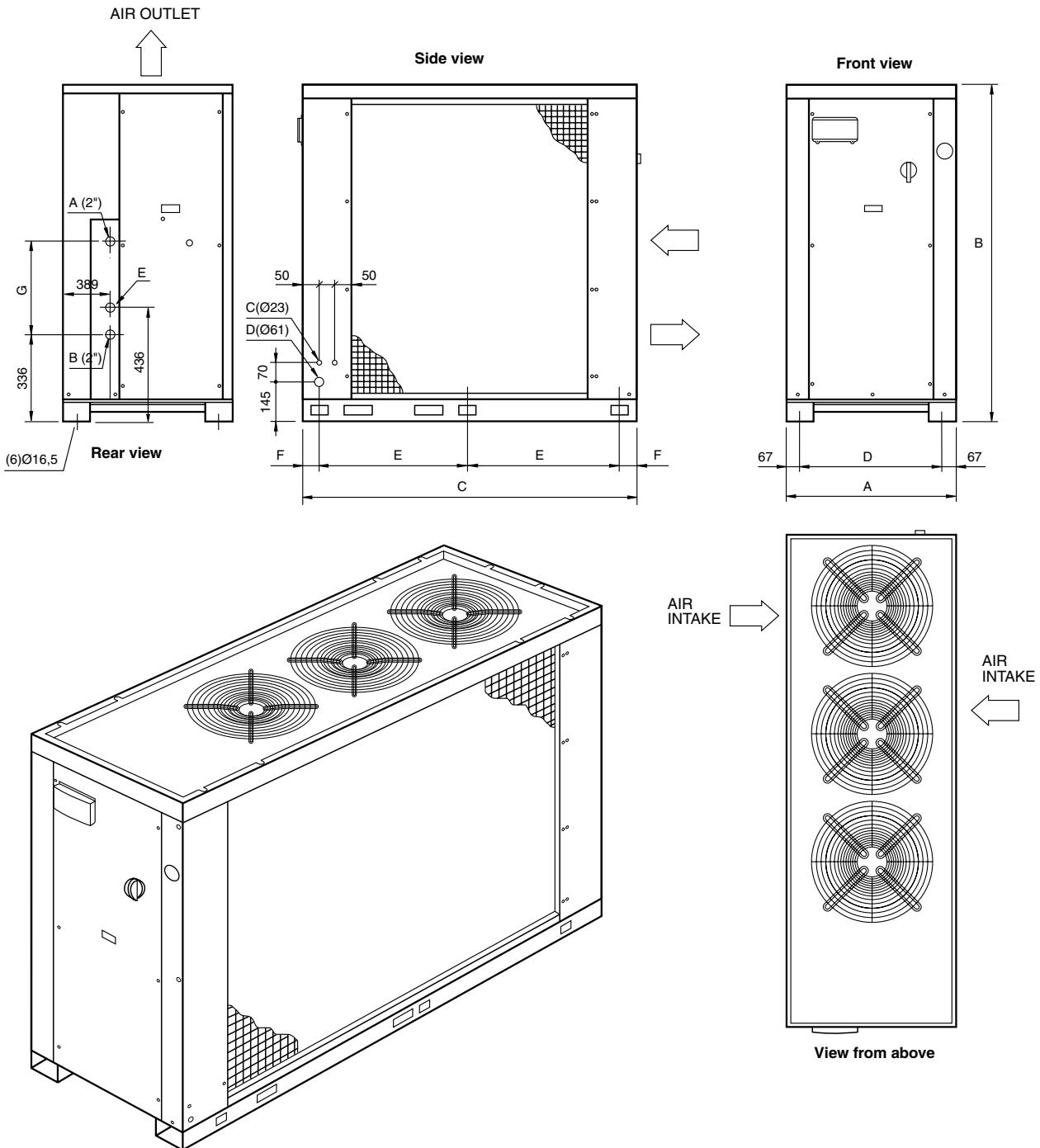
YCSA/YCSA-H 50 and 60 T TP


Notes:

- A- Water intake, Ø 2" Gas F.
- B- Water outlet, Ø 2" Gas F.
- C- Auxiliary lines.
- D- Power supply.
- E- Water intake 3/8" Gas F.

Dimensions and hydraulic connections

YCSA/YCSA-H 80 and 100 T TP

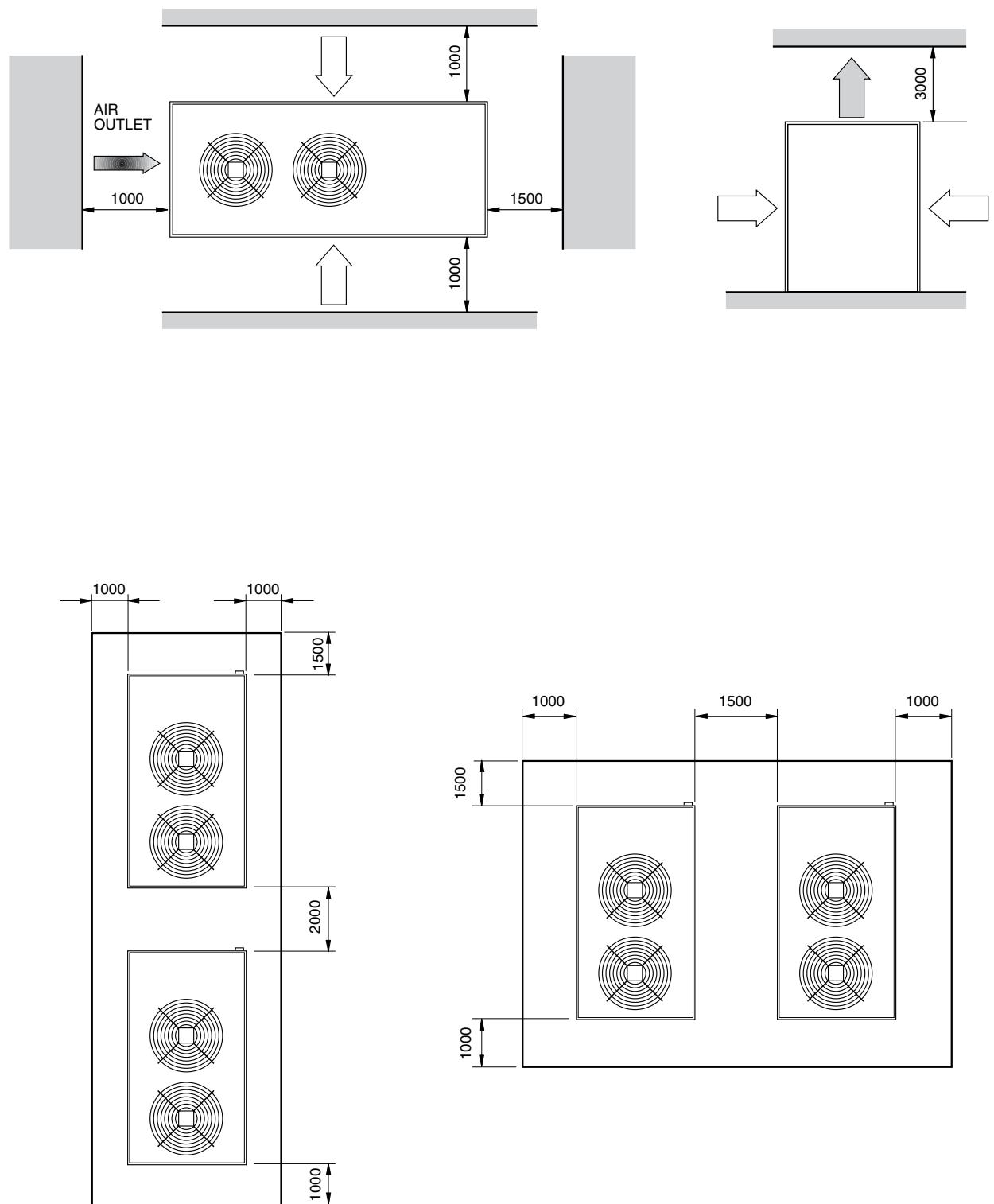


YCSA/ YCSA-H	A	B	C	D	E	F	G
80	1108	1400	2943	970	1265	207	317
100	1140	1582	3336	1002	1318	350	327

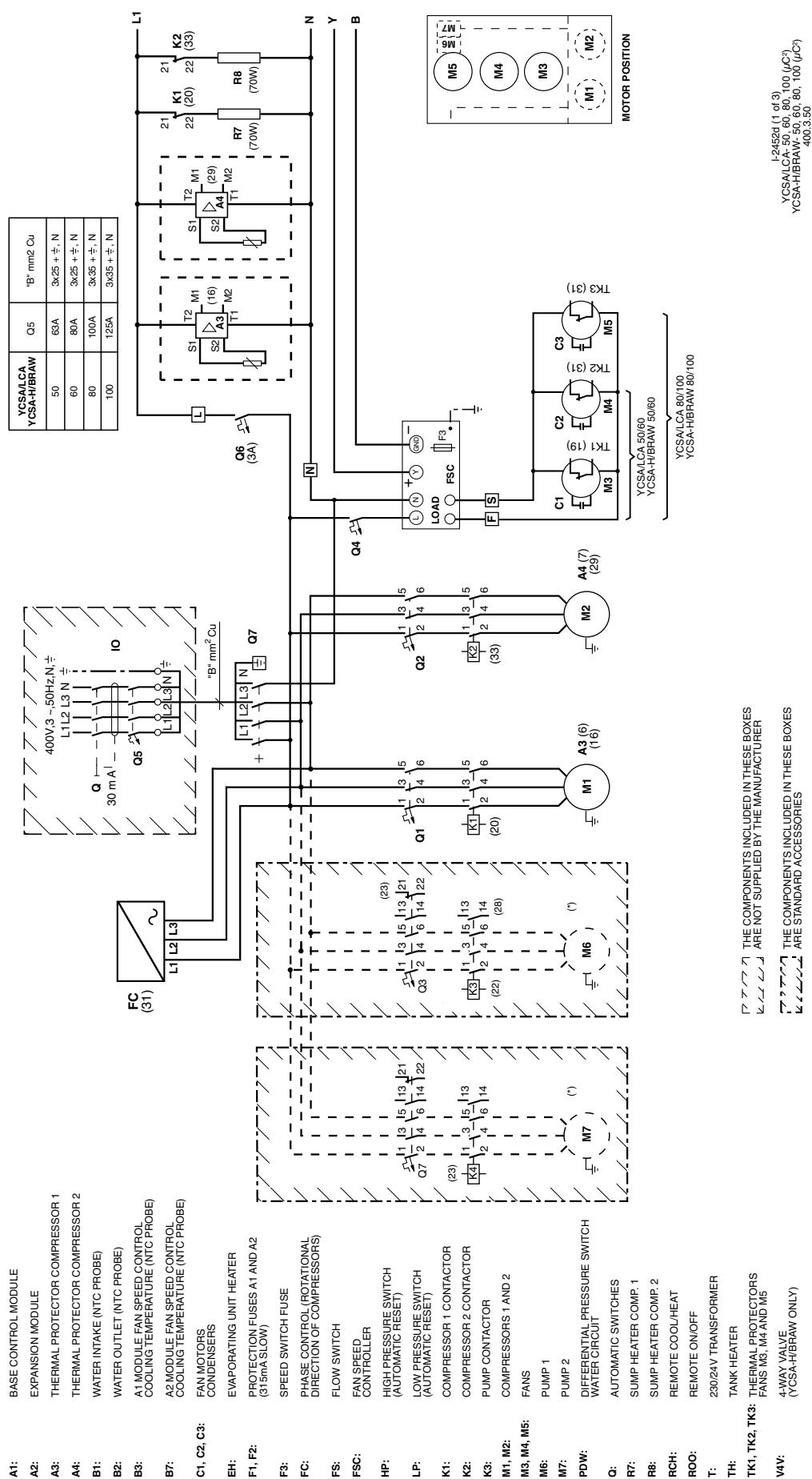
Notes:

- A- Water intake, Ø 2" Gas F.
- B- Water outlet, Ø 2" Gas F.
- C- Auxiliary lines.
- D- Power supply.
- E- Water intake 3/8" Gas F.

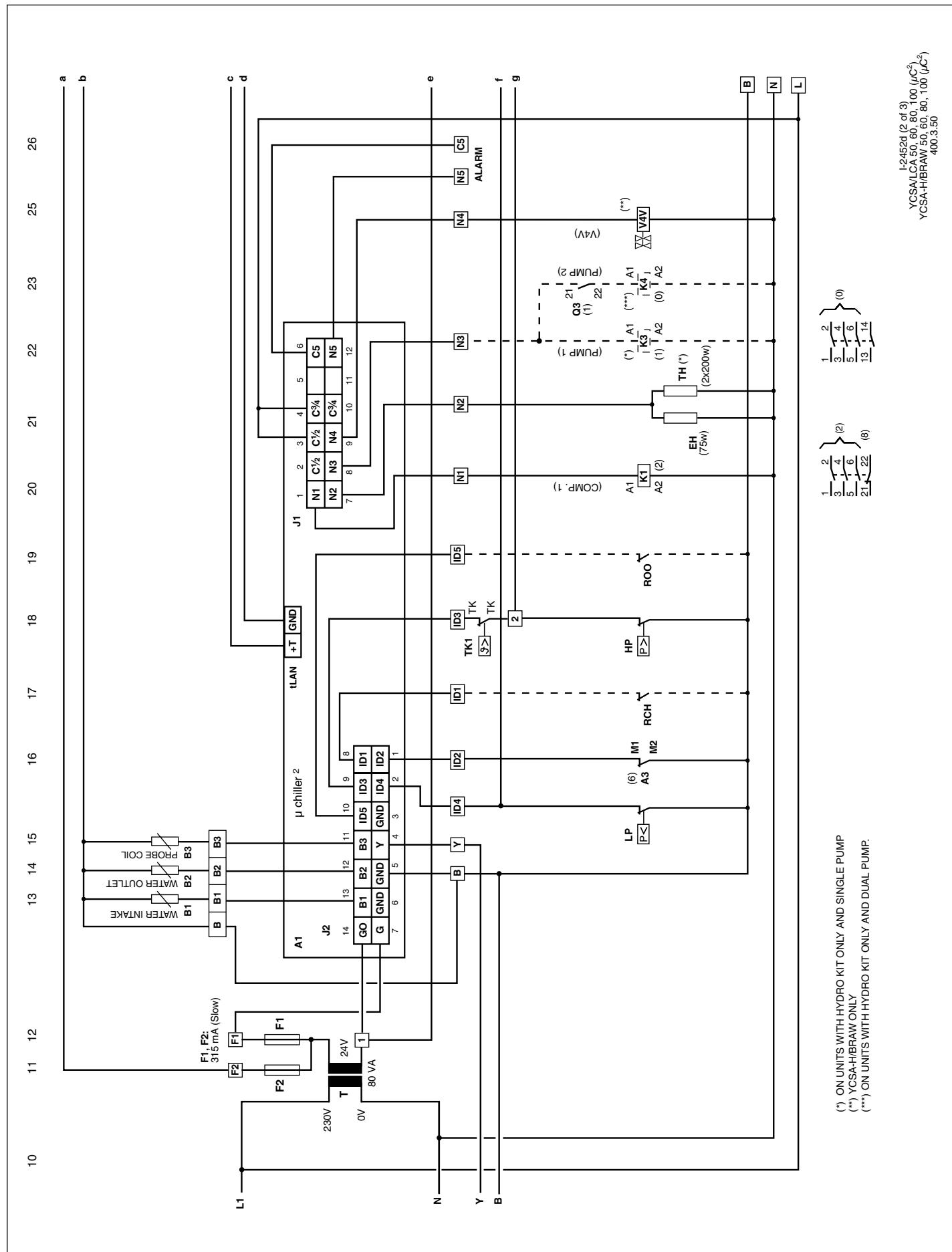
Minimum technical clearance



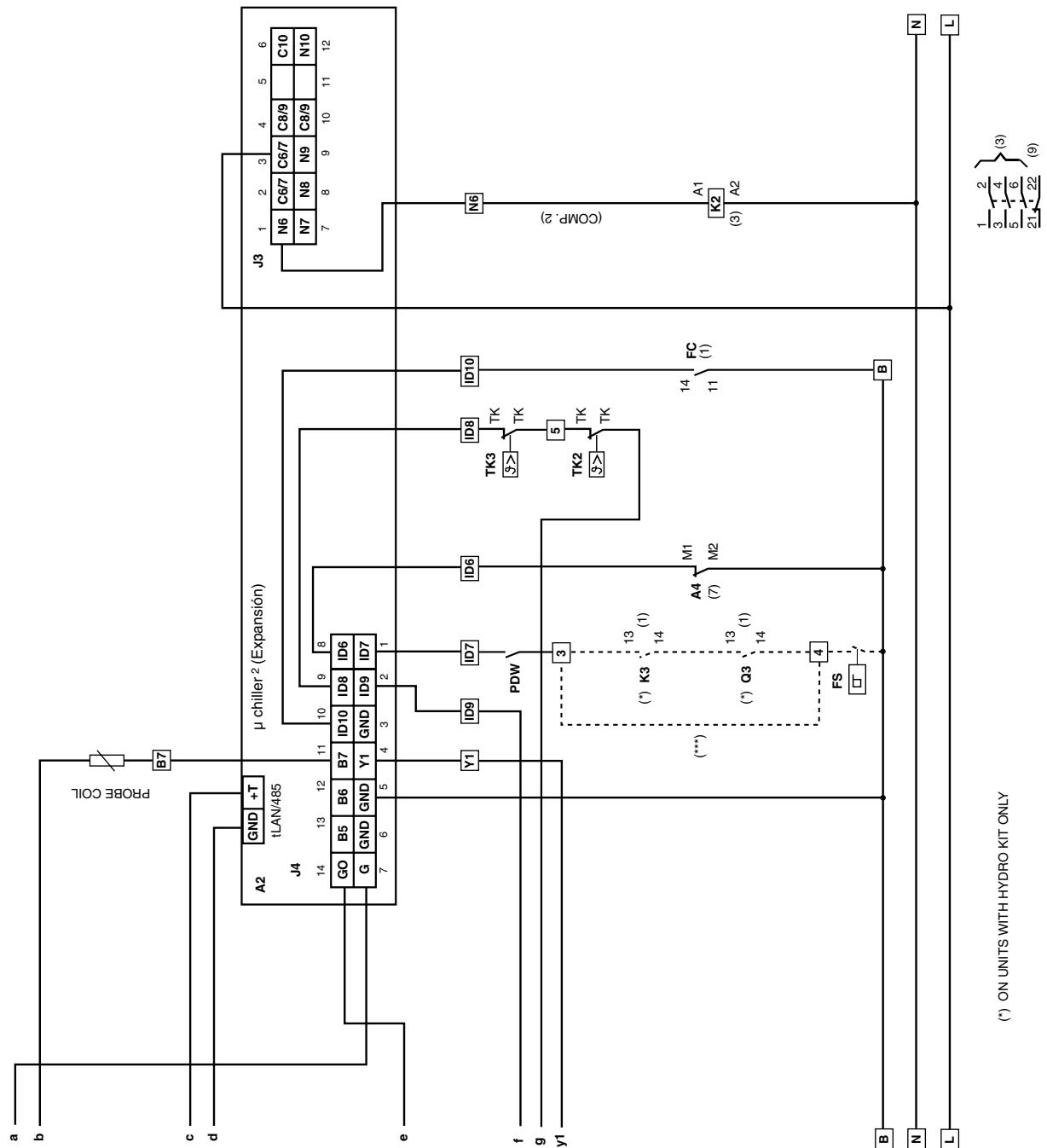
Wiring diagram, YCSA/YCSA-H 50, 60, 80 and 100 (μ C2), 400.3.50 (1/3)



Wiring diagram, YCSA/YCSA-H 50, 60, 80 and 100 (μ C2), 400.3.50 (2/3)



Wiring diagram, YCSA/YCSA-H 50, 60, 80 and 100 (μ C2), 400.3.50 (3/3)

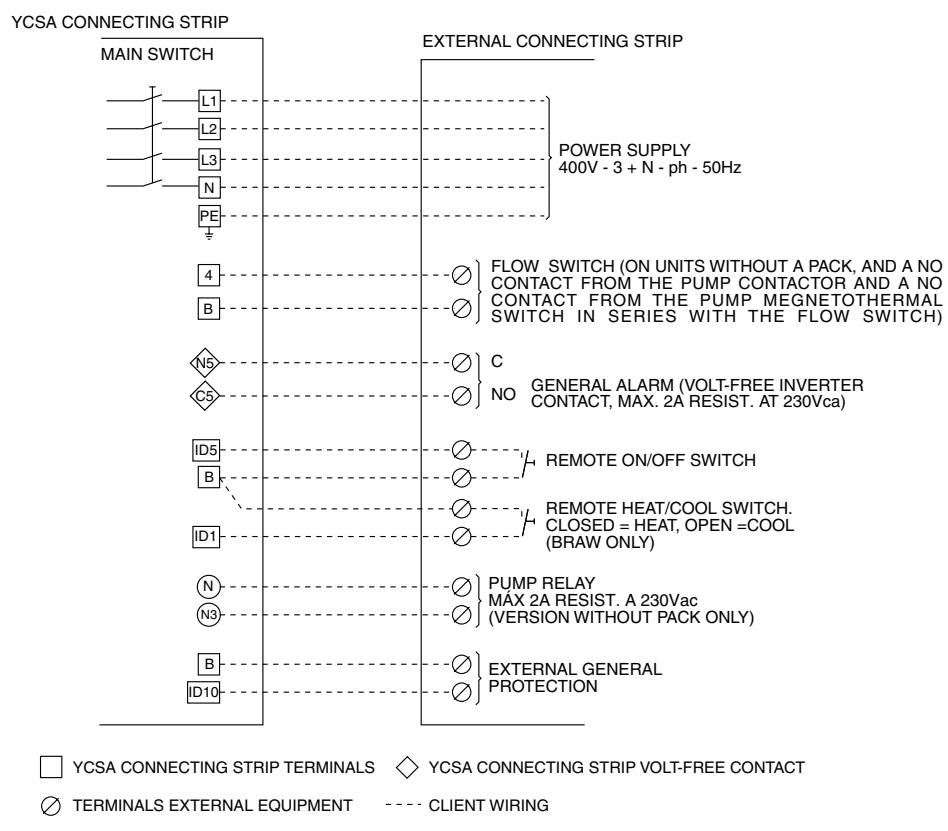


(*) ON UNITS WITH HYDRO KIT ONLY

I-2452d (3 of 3)
 YCSA/LCA 50, 60, 80, 100 (μ C²)
 YCSA-H/BRAW 50, 60, 80, 100 (μ C²)
 400, 3.50

Wiring

YCSA/YCSA-H 50, 60, 80 and 100 T/TP



Electrical characteristics

Model	Power supply V.ph.Hz.	Compressor				Fans		Pump Nominal	
		Nominal A		Start A	Nominal kW		Nominal A	Nominal W	A
		Cool	Heat		Cool	Heat			
YCSA-H 50	400.3.50	2 x 15.5	2 x 16	127	2 x 8.72	2 x 9	2 x 1.8	2 x 365	2.9
YCSA 50		2 x 16.5	-		2 x 8.6	-			
YCSA-H 60		2 x 17.7	2 x 17.5	167	2 x 10.65	2 x 10.3	2 x 2.6	2 x 575	3.4
YCSA 60		2 x 19.5	-		2 x 11.3	-			
YCSA-H 80		2 x 23.8	2 x 24.6	198	2 x 13.2	2 x 13.9	3 x 2.6	3 x 575	4.3
YCSA 80		2 x 23.5	-		2 x 12.8	-			
YCSA-H 100		2 x 30	2 x 29.3	225	2 x 17.6	2 x 16.9	3 x 3.35	3 x 830	5.2
YCSA 100		2 x 29.3	-		2 x 17.45	-			

Limits of use

Model	Voltage limits		DB air inlet temperature to coil				Water outlet temperature				Temp. differential between the water outlet and intake	
	Nominal at 400		Operating cycle				Operating cycle				Minimum °C	
			Minimum °C		Maximum °C		Minimum °C		Maximum °C			
	Minimum	Maximum	Cool	Heat	Cool	Heat	Cool	Heat	Cool	Heat	Minimum °C	Maximum °C
YCSA	342	436	-10 (3)	-	46 (2)	-	6 (1)	-	15	-	3	7
YCSA-H				-10		20		30		50 (4)		

(1) At lower water temperatures, it is advisable to use glycol type antifreeze mixtures. Minimum T° with glycol -5 (2) IPESL - SdM - UMT - TÜV, 38°C SAQ, 40°C DUTCH. (3) -18°C with low temperature kit (optional) in models YCSA (4) 50°C if intake air is 0°C.

Prior to final approval of the installation

Check:



- That voltage is always between 342 - 436 V.
- That the power supply cable section is at least equal to the section recommended in the corresponding wiring diagrams.



- That the guarantee card has been filled out.
- That maintenance instructions have been given, or a periodical revision contract has been signed.



- That operating instructions have been given to the user.

Operating instructions µC2 + Expansion

(Rev. 1015)

Unit description

This is a multipurpose controller specially programmed for use with air-water chillers and heat pumps equipped with a tandem compressor, two power stages and one single cooling circuit.

Main functions

- Water temperature control (at intake or outlet, as per parameter r6).
- Defrost cycle management.
- System operating and safety management.
- Fan speed control.
- Alarm management.
- Connection for supervision and telephone assistance (access serial connection RS485).

Devices controlled

- Compressors
- Fans
- Four-way valve
- Water pump
- Alarm device
- Heaters

Standard components

- System and first compressor control base module. This is the central nucleus that processes the signals coming from the probes and protection elements of the entire system to control its active elements: compressor 1, fans, four-way valve, water circulating pump, alarm relay and antifreeze heater. Power supply 24 Vac.

Can also be used for access and control of the system by means of the display, buttons and LEDs available. Allows selection cool, heat and off functions. Operating parameters can also be modified, and the system can be supervised as well.

- Second compressor expansion and control board. This is an expansion of the base module to be connected by means of two cables. Controls operation of the second compressor.

- Fan speed control module. Operates by phase cut-off. Includes fuse.

- NTC probes. 4 NTC probes are used to read system temperatures. One is located at the water intake of the evaporating unit, another at the water outlet of said evaporating unit, and the remaining two at each coil to control the single-phase fan speeds and the defrost cycle.

Parameters

The set of parameters that configure the operating program of the unit is divided into four levels (*Factory, Super User, User and Direct*), depending upon the function of each parameter and the user's access level. The parameters of each level can be modified from that same level, as well as lower level parameters.

Factory level

Accessible with the Factory password. Allows configuration of all unit parameters.

Super User level

Accessible with password22. Allows access to the regular parameters the user must adjust.

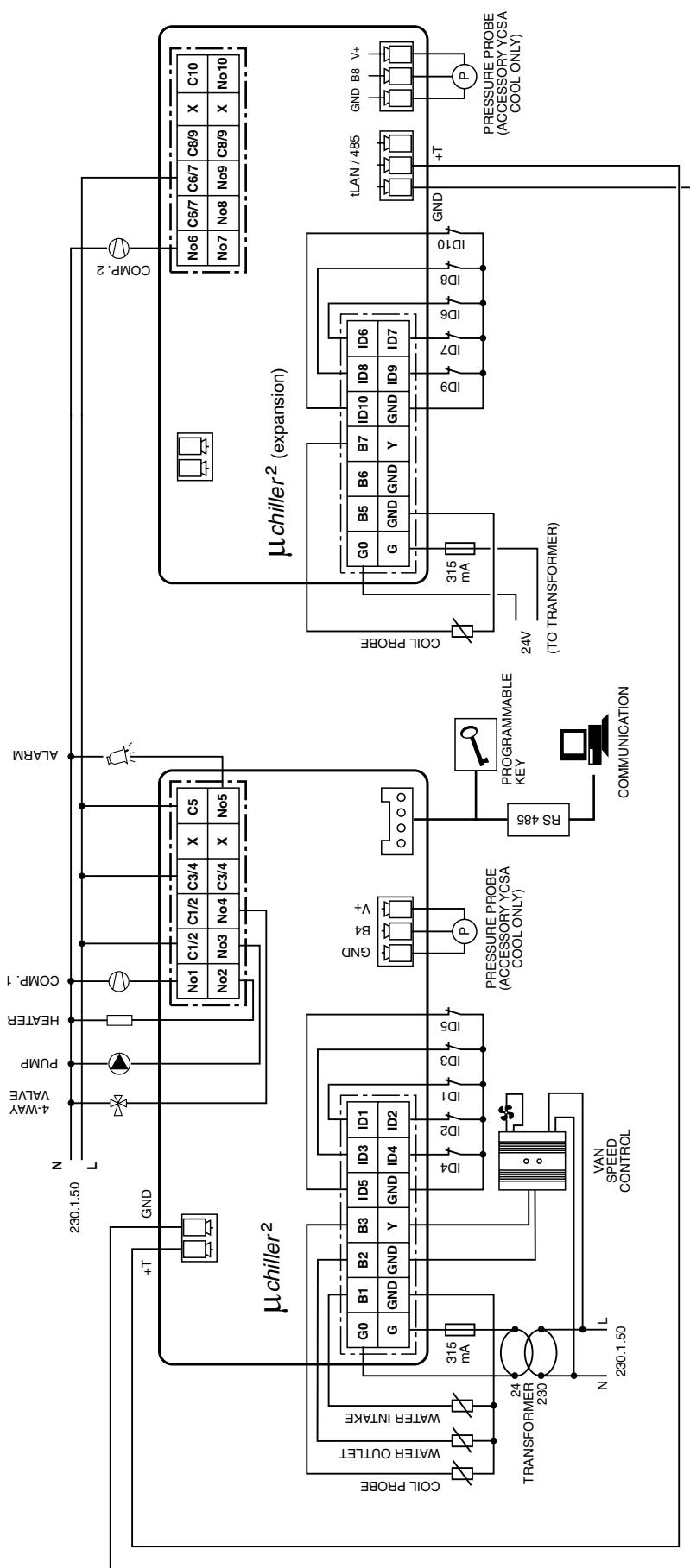
Direct level

Accessible without a password. Allows reading the values detected by the probes, as well as other system values. Can be used by the user without affecting unit operation.

General

Modification of the parameters that affect basic unit configuration should be made with the controller in Standby position.

General diagram

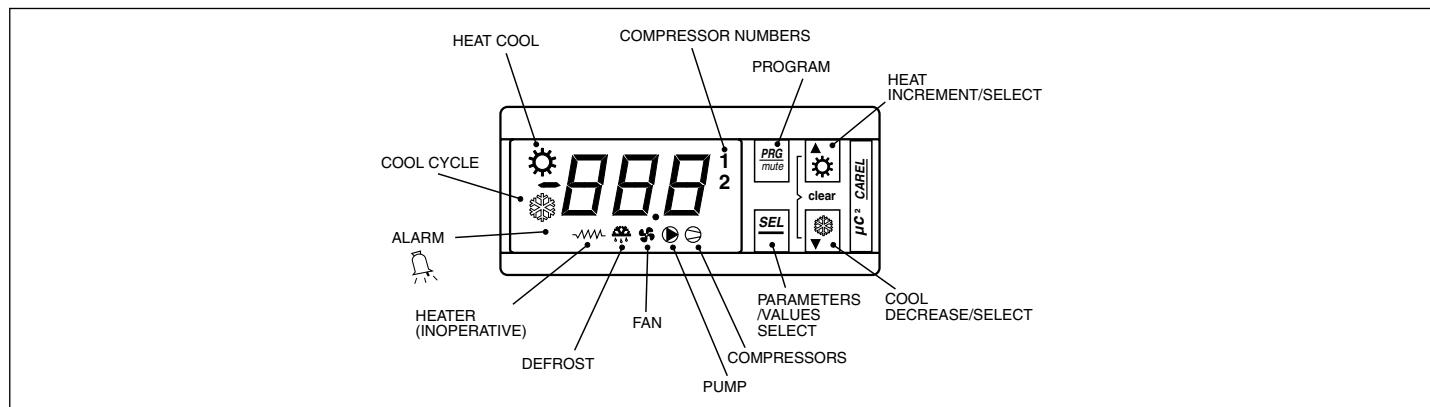


ID1: REMOTE COIL/HEAT
ID2: COMP. 1 THERMAL PROTECTOR
ID3/ID8: FAN HIGH PRESSURE SWITCH
AND THERMAL PROTECTORS
ID4/ID9: LOW PRESSURE SWITCH
ON/OFF ID6: PUMP 2
THERMAL PROTECTOR ID7: CFLOW SWITCH ID10:
PGENERAL PROTECTION

Symbols on the display

The display has three figures in green, plus a symbol and a decimal. It also shows the symbols, in amber, of the functions selected (the alarm symbol is red).

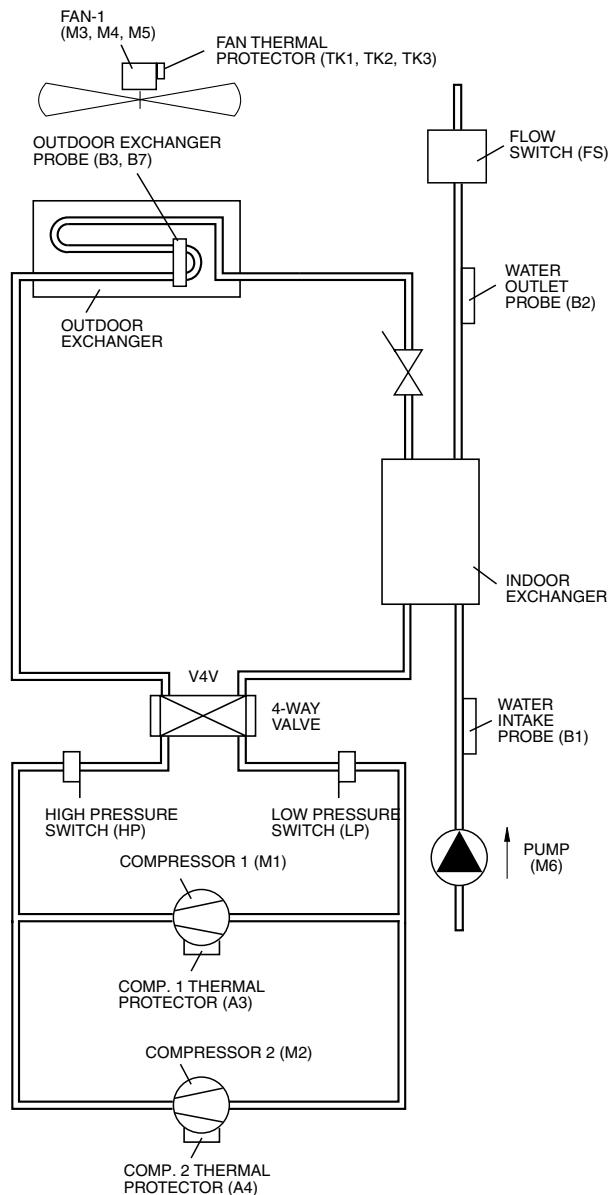
Symbol	Colour	Meaning	
		With LED on permanently	With LED flashing
1;2	Amber	Compressor 1 and/or 2 in operation	Timing start-up
(○)		Compressors under call	-
(●)		Water pump in operation	-
(■)		Fans in operation	-
(△)		Defrost active	-
!	Red	Alarm active	-
(*)	Amber	Cool cycle	-
(*)		Heat cycle	-



Functions related to the control buttons

BUTTON	UNIT STATUS	PRESSING
Prg/mute	Loads values by default	Applies voltage when pressed
	Return to superior sub-group within programming area until output of same (except changes in E2PROM)	Simply press
Sel	Access to <i>Direct</i> parameters	Press 5 seconds
	Selects a <i>Direct</i> parameter and shows its value / Confirms parameter changes	Simply press
Prg+Sel	Programming parameters with <i>password</i>	Press 5 seconds
▲ (Sun)	Selects superior parameter within the programming area	Simply press or continuous
	Increase value	Simply press or continuous
	Selects heat function from <i>standby</i> position and vice-versa (P6=1)	Press 5 seconds
▼ (Snowflake)	Selects lower parameter within programming area	Simply press or continuous
	Lower value	Simply press or continuous
	Selects cool function from <i>standby</i> position and vice-versa (P6=1)	Press 5 seconds
▼ (Snowflake) + ▲ (Sun)	Manual alarm reset	Press 5 seconds
	Clears hour counters (within programming area)	Press 5 seconds
SEL + ☀	Forced manual defrost	Press 5 seconds

Location of controls



Parameter tables

The following tables show the parameters and their values divided into groups.
 S = Super User
 F = Factory

Parameter level codes

D = Direct
 U = User

Variables for supervision (VS)

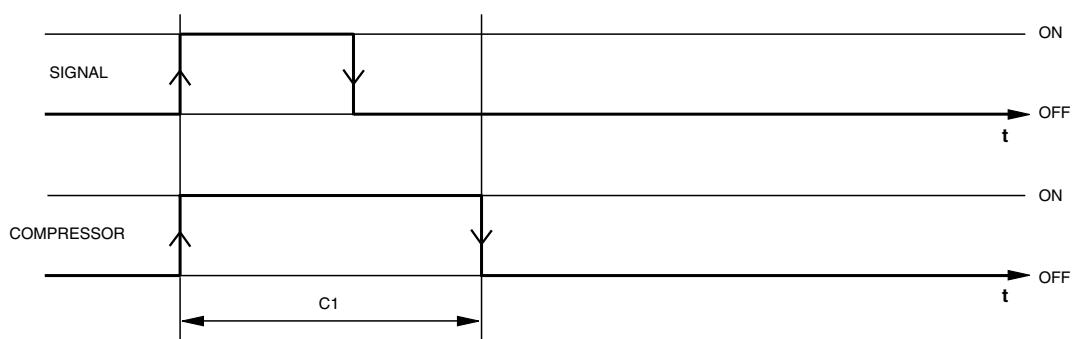
R/W = Read/write parameter
 R = Read only parameter

Parameters related to the probes							
Display	Description	Level	VS	Unit	Max.	Min.	Value
/01	NTC B1 probe (water intake); 0=absent (function not available). 1=present. 1= presente	F	1 (R/W)	-	1	0	1
/02	NTCB2 probe (water outlet). 0=absent(function not available). 1=presente NTC B3 probe (refrigerant temp.). 0=absent	F	2 (R/W)	-	1	0	1
/03	(yes/04=3); 1=present (yes/04=0);	F	14 (R/W)	-	1	0	1
/04(1)	Probe type B4, 0=absent, 1=ON/OFF, 2=NTC, 3=ratiometric 5Vdc.	F	15 (R/W)	-	3	0	0
/07	Probe type B7 (refrigerant temp.). 0=absent (yes/08=3). 1=present (yes/04=3).	F	16 (R/W)	-	1	0	1
/08(1)	Probe type B8, 0=absent, 1=ON/OFF, 2=NTC, 3=ratiometric 5Vdc.	F	17(R/W)	-	3	0	0
/09(1)	Minimum input voltage	F	18 (R/W)	0.01 Vdc	/10	0	50
/10(1)	Maximum input voltage	F	19 (R/W)	0.01 Vdc	500	/09	450
/11(1)	Minimum pressure	F	1 (R/W)	bar	/12	0	0
/12(1)	Maximum pressure	F	2 (R/W)	bar	99.9	/11	34.5
/13	Calibration probe B1	F	3 (R/W)	°C	12	-12	0
/14	Calibration probe B2	F	4 (R/W)	°C	12	-12	0
/15	Calibration probe B3	F	5 (R/W)	°C	12	-12	0
/16(1)	Calibration probe B4 (accessory)	F	6 (R/W)	bar	12	-12	0
/19	Calibration probe B7	F	9 (R/W)	°C	12	-12	0
/20(1)	Calibration probe B8 (accessory)	F	10 (R/W)	bar	12	-12	0
/21	Digital filter	U	20 (R/W)	-	15	1	4
/22	Input limitation	U	21 (R/W)	-	15	1	8
/23	Measuring unit 0 = C; 1 = F	U	5 (R/W)	-	1	0	0
b00	Probe viewed on display	U	24 (R/W)	-	7	0	0
b01	Value read by probe B1	D	70 (R)	°C	-	-	-
b02	Value read by probe B2	D	71 (R)	°C	-	-	-
b03	Value read by probe B3	D	72 (R)	°C	-	-	-
b04(1)	Value read by probe B4	D	73 (R)	°C/bar	-	-	-
b7	Value read by probe B7	D	76 (R)	°C	-	-	-
b08(1)	Value read by probe B8	D	77 (R)	bar	-	-	-

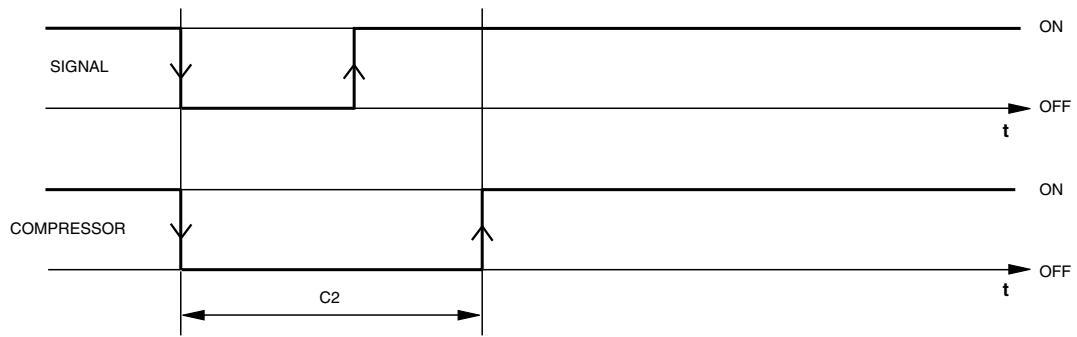
(1) Ratiometric pressure switch probes for low ambient kit applicable on cool only units (accessory for adjusting fan speeds at -18°C). (Change /04=3; /08=3; /03=0; /07=0)

Parameters related to the probes							
Display	Description	Level	VS	Unit	Max	Min	Value
c01	Minimum operating time	U	25 (R/W)	Sec.	999	0	120
c02	Minimum OFF time	U	26 (R/W)	Sec.	999	0	60
c03	Time between start-ups of the same compressor	U	27 (R/W)	Sec.	999	0	300
c04	Time between start-ups of two compressors	U	28 (R/W)	Sec.	999	0	3
c05	Time between OFF of two compressors	U	29 (R/W)	Sec.	999	0	3
c06	Start-up timed	U	30 (R/W)	Sec.	999	0	10
c07	Compressor start-up delay with regard to the pump	U	31 (R/W)	Sec.	150	0	20
c08	Pump OFF delay with regard to the compressor	U	32 (R/W)	Min.	150	0	1
c10	Operating hour counter compressor 1	D	90 (R)	Hours	800	0	-
c11	Operating hour counter compressor 2	D	91 (R)	Hours	800	0	-
c14	Operating hour counter for compressor maintenance	U	34 (R/W)	Hours	100	0	0
c15	Operating hour counter for pump	D	94 (R/W)	Hours	800	0	-
c17	Minimum time between pump start-ups	U	35 (R/W)	Min.	150	0	5
c18	Minimum operating time for pump	U	36 (R/W)	Min.	15	0	2

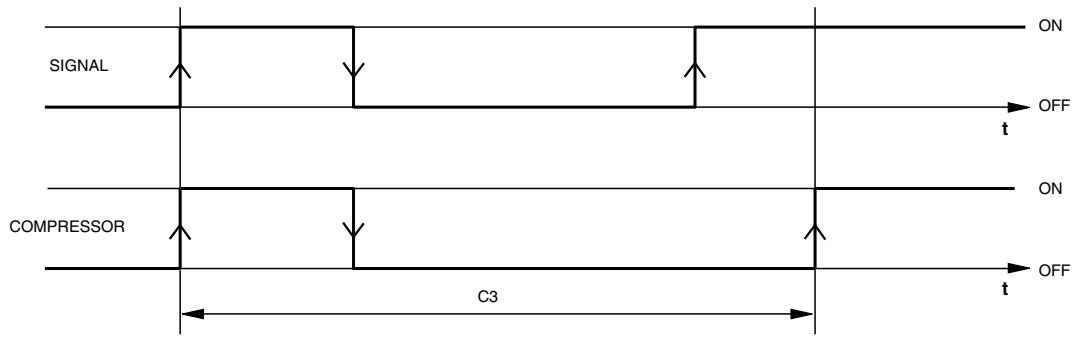
Minimum operating time of a compressor



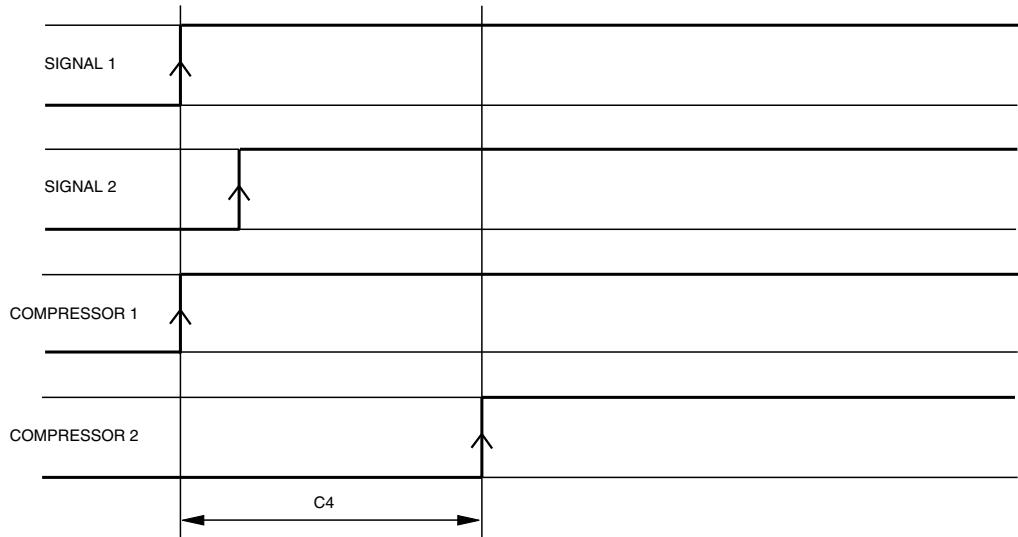
Minimum OFF time of a compressor



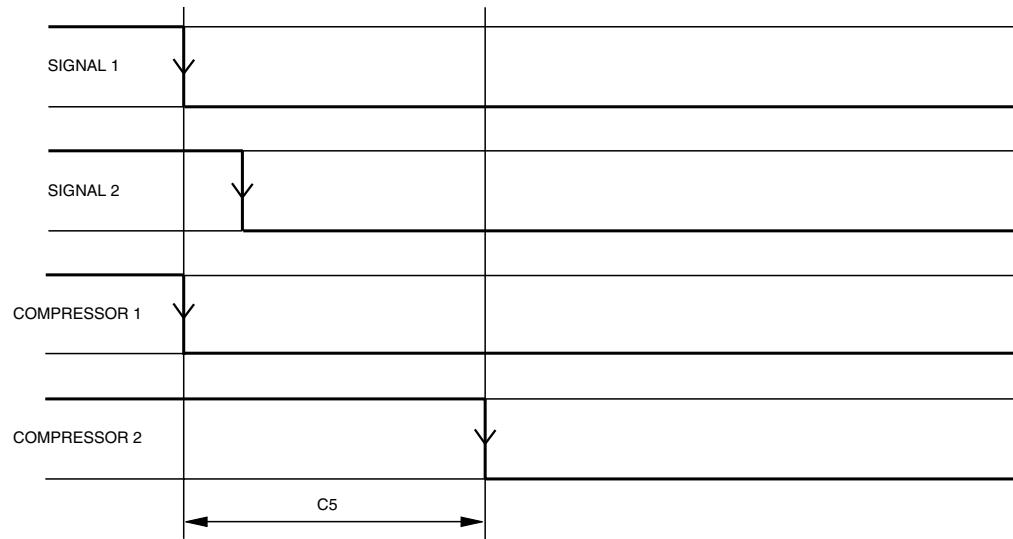
Minimum time between compressor start-ups



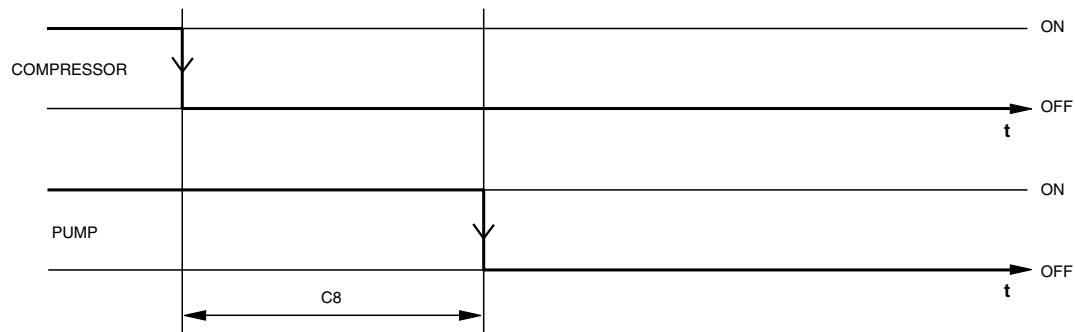
Time between start-ups of two compressors



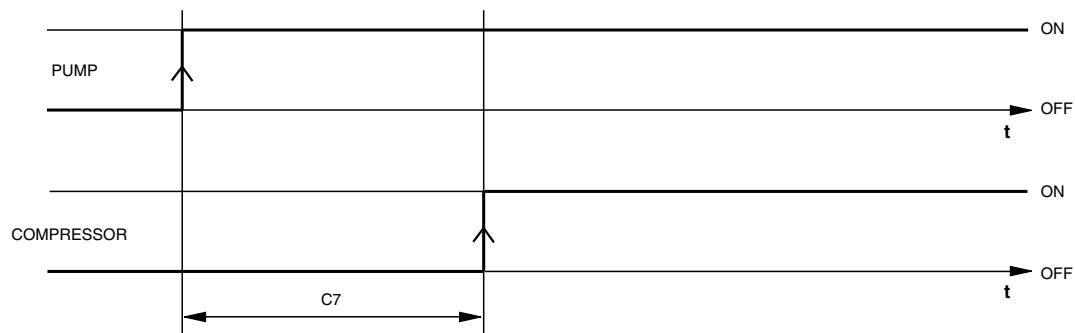
Time between OFF of two compressors



Compressor/pump OFF delays

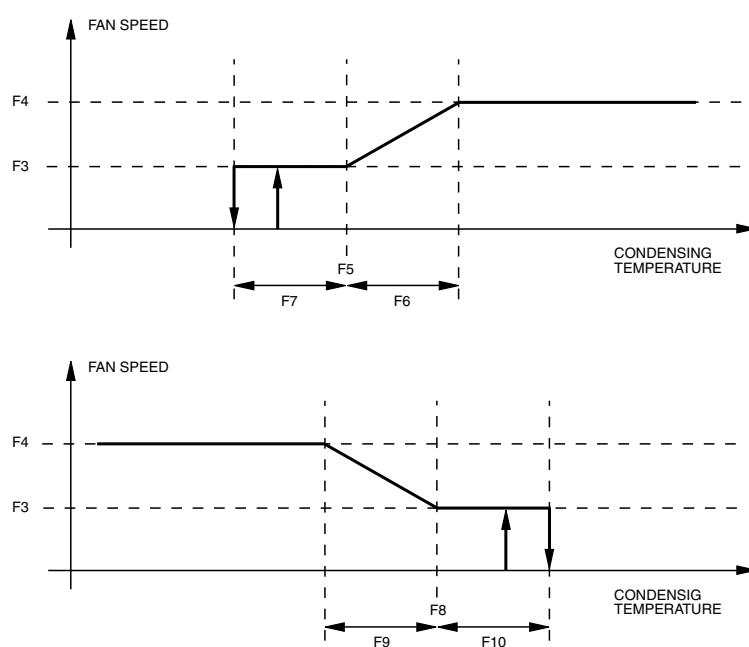


Pump/compressor start-up delays



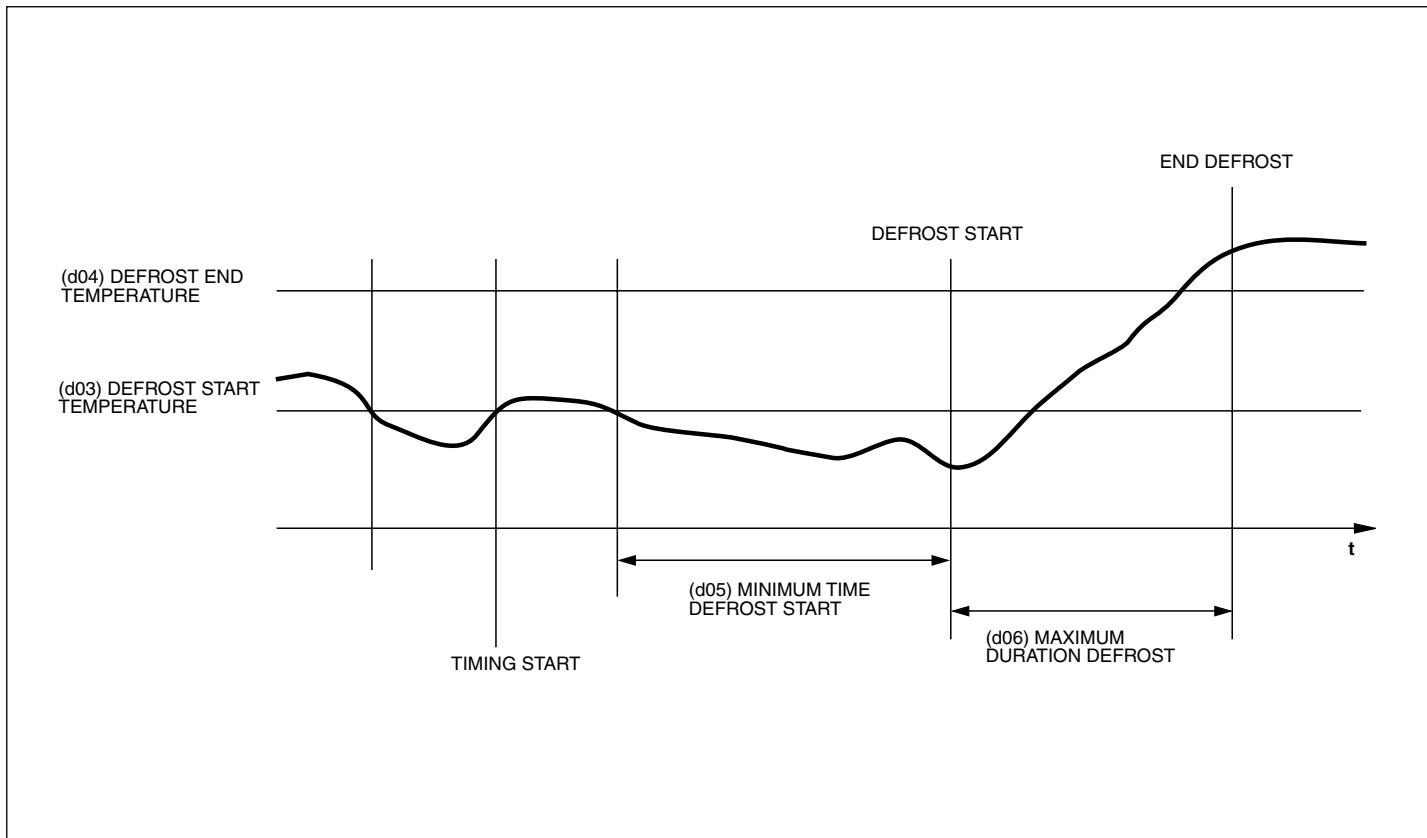
Parameters related to the fans							
Display	Description	Level	VS	Unit	Max.	Min.	Value
F01	Fan outlet. 0=absent (function not available); 1=present	F	10 (R/W)		1	0	1
F02	Operating mode: 0= always ON (function not available) 1= Parallel with compressor (function not available) 2= ON/OFF operation (function not available) 3= Parallel with compressor and speed adjustment.	U	48 (R/W)		3	0	3
F03	Minimum triac voltage	F	49 (R/W)	step	F04	0	40
F04	Maximum triac voltage	F	50 (R/W)	step	100	F03	75
F05	Cold cycle minimum speed temperature Cool cycle minimum speed pressure (1)	F	24 (R/W)	°C bar	80	-40	32 13
F06	Cool cycle maximum speed temp. differential Cool cycle maximum speed pressure differential (1)	F	26 (R/W)	°C bar	50	0	5 3
F07	Cool cycle fan OFF differential Cool cycle fan OFF pressure differential (1)	F	28 (R/W)	°C bar	50	0	17 5
F08	Heat cycle minimum speed temperature	F	30 (R/W)	°C bar	80	-40	6 5
F09	Heat cycle maximum speed differential	F	32 (R/W)	°C bar	50	0	3 1
F10	Heat cycle fan differential	F	34 (R/W)	°C bar	F08	0	6 1
F11	Fan start-up time	F	51 (R/W)	sec.	120	0	90
F12	Triac impulse duration	F	52 (R/W)	sec.	10	0	2
F13	Triac impulse duration Fan management in defrost mode. 0= fan deactivated 1= fan activated in cool cycle mode (function not available) 2= fan deactivated until defrost end temperature is reached and start-up at maximum speed for d16	F	53 (R/W)		2	0	2

(1) Parameters to be programmed when pressure probes are to be used (low ambient kit accessory for cool only units).



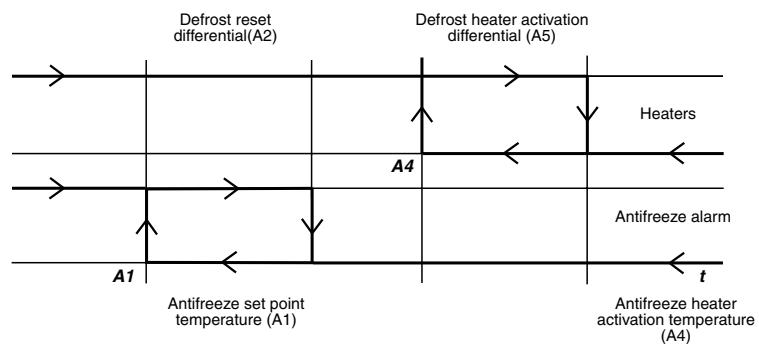
Parameters related to defrost

Display	Description	Level	VS	Unit	Max.	Min.	Value
d01	Execution of defrost 0= no (function not available) 1= yes.	U	7 (R/W)	-	1	0	1
d02	Time or temperature defrost. 0= time (function not available). 1= temperature	U	8 (R/W)	-	1	0	1
d03	Defrost start temperature	U	19 (R/W)	°C	d04	-40	-3
d04	Defrost end temperature	U	21 (R/W)	°C	80	d03	20
d05	Minimum time for defrost start	U	37 (R/W)	sec.	150	10	10
d06	Minimum defrost duration	U	38 (R/W)	sec.	150	0	0
d07	Maximum defrost duration	U	39 (R/W)	Min.	15	1	9
d08	Time between two defrost cycles	U	40 (R/W)	Min.	150	10	30
d11	Activation heaters in defrost 0= no. 1= yes.	U	9 (R/W)	-	0	1	1
d12	Compressor OFF before defrost	F	43 (R/W)	Min.	3	0	1
d13	Compressor OFF after defrost	F	44 (R/W)	Min.	3	0	1
d16	Time of forced vent after defrost (only yes F13=2).	F	47 (R/W)	sec.	360	0	60



Parameters for defrost control configuration

Display	Description	Level	VS	Unit	Max.	Min.	Value
A01	Antifreeze control set point temperature	U	11 (R/W)	°C	-	A07	3
A02	Antifreeze reset differential	U	12 (R/W)	°K	50	0.3	5
A03	Antifreeze alarm bypass time	U	22 (R/W)	sec.	150	0	0
A04	Antifreeze heater activation temperature	U	13 (R/W)	°C	r16	A01	3
A05	Antifreeze heater activation differential	U	14 (R/W)	°K	50	0.3	1
A06	Backup heater control probe 0= control probe 1= antifreeze probe-	F	6 (R/W)	-	1	0	0
A07	Antifreeze control set point temperature minimum limit	U	15 (R/W)	°C	79	-40	3
A08	Heating heater activation set point temperature	U	16 (R/W)	°C	r15	A01	25
A09	Heater deactivation set point temperature differential in heating	U	17 (R/W)	°C	50	0.3	3
A10	Automatic start-up by antifreeze alarm 0= function deactivated 1= Water pump starts 2= Pump and compressor start in heat cycle (heat pump only) 3= Heater in operation	U	23 (R/W)		3	0	3



Parameters for unit configuration							
Display	Description	Level	VS	Unit	Max.	Min.	Value
H01	Unit model. 2= air-water intake (YCSA); 3= air-water heat pump (YCSA-H).	F	54 (R/W)				2 (YCSA) 3 (YCSA-H)
H02	Number of vent circuits (do not modify this parameter)	F	12 (R/W)				0
H03	No. of evaporating units present (do not modify this parameter)	F	13 (R/W)				0
H04	No. of compressors per circuit (do not modify this parameter)	F	55 (R/W)				2
H05	Pump operation 0= absent 1= Always ON 2= ON upon regulator call 3= On under regulator and time call	F	56 (R/W)		3	0	1
H06	COOL/HEAT digital intake 0= Absent. 1= Present	U	14 (R/W)		1	0	0
H07	ON/OFF digital intake 0= Absent. 1= Present	U	15 (R/W)		1	0	0
H08	Network configuration (do not modify this parameter).	F	57 (R/W)		3	0	2
H09	Keyboard locked 0= Disabled. 1= Abled	U	16 (R/W)		1	0	1
H10	Serial direction for supervision. 0= Future use as terminal	U	58 (R/W)		200	1	1
H11	Output configuration (not selectable)	F	59 (R/W)		3	0	0
H12	4-way valve logic operation. Activated in cold cycle. (Do not modify this parameter).	F	60 (R/W)		3	0	0
H21	Second pump operation. (Do not modify this parameter)	F	62 (R/W)		4	0	0
H22	Default loading of parameters disabled. 0= Disabled. 1= Abled.	F	18 (R/W)		1	0	0
H23	Enabling "Modbus" protocol. 0= Disabled. 1= Abled.	F	11		1	0	0

Parameters for alarm configuration

Display	Description	Level	VS	Unit	Max.	Min.	Value
P01	Alarm delay by flow switch at start-up.	U	63 (R/W)	Sec.	150	0	20
P02	Alarm delay by flow switch with unit in operation.—	U	64 (R/W)	Sec.	120	0	5
P03	Alarm delay by low pressure switch at start-up.	U	65 (R/W)	Sec.	200	0	60
P05	Alarm reset 0= Low and high pressure switch, antifreeze control and thermal protectors OFF are manual reset.	F	67 (R/W)				0
P06	Cool and heat cycle symbol. 1= "Sun" heat cycle, "Snow flake" cool cycle. 0= "Sun" cool cycle, "Snow flake" heat cycle.	F	19 (R/W)		1	0	1
P08	Digital intake 1 for remote setting Cool/Heat. Do not modify this parameter.	F	69 (R/W)				9
P09	Digital intake 2 for comp. 1 thermal protector operation. Do not modify this parameter.	F	70 (R/W)				5
P10	Digital intake 6 for comp. thermal protector operation. Do not modify this parameter.						7
P11	Digital intake 7 for flow switch operation.	F					1
P12	Digital intake 10 for phase control function. Do not modify this parameter.	F					3
P15	Low pressure alarm selection. 0= Inoperative with compressor OFF. 1= Operative with compressor OFF.	F	76 (R/W)		1	0	1
P16	High water temperature alarm of return water.	U	38 (R/W)	°C	80	-40	30
P17	High pressure delay at start-up.	U	77 (R/W)	Sec.	250	0	30
P18	High pressure alarm by transducer 0= Function disabled	F	39 (R/W)	bar	99.9	0.1	30.3
P19	Low pressure alarm of return water.	U	40 (R/W)	°C	80	-40	10
P20	Alarm activation by high or low water temperature at start-up. 1= Function abled. 0= Function disabled.	U	20 (R/W)		1	0	0

Parameters for regulator configuration

Display	Description	Level	VS	Unit	Max.	Min.	Value
r01	Cool cycle set point temperature	U	41 (R/W)	°C	r14	r13	12
r02	Cool set point temperature differential	U	42 (R/W)	°C	50	0.3	2
r03	Heat cycle set point temperature	U	43 (R/W)	°C	r16	r15	40
r04	Heat cycle set point temperature differential	U	44 (R/W)	°C	50	0.3	3
r05	Compressor rotation 0= Disabled 1= FIFO type 2= By operating hours	F	78 (R/W)		2	0	2
r06	Type of adjustment 0= Proportional. Intake temperature. 1= Proportional + neutral zone. Intake temp. 2= Proportional. Output temperature. 3= Proportional + neutral zone. Output temp. 4= By time + dead zone. Output temperature (chillers only).	F	79 (R/W)		4	0	0
r07	Neutral zone differential	F	45 (R/W)	°C	50	0	1
r08	(Yes r06=4 only) Maximum activation time. Output temperature:-	F	80 (R/W)	Sec.	999	r09	120
r09	(Yes r06=4 only) Minimum activation time. Output temperature:-	F	81 (R/W)	Sec.	999	c04	100
r10	(Yes r06=4 only) Maximum deactivation time. Output temperature:-	F	82 (R/W)	Sec.	999	r11	120
r11	(Yes r06=4 only) Maximum deactivation time. Output temperature:-	F	83 (R/W)	Sec.	999	c05	100
r12	(Yes r06=4 only) Compressor deactivation differential.	F	46 (R/W)	°C	50	0	1
r13	Cool cycle minimum set point temperature.	U	47 (R/W)	°C	r14	-40	6
r14	Cool cycle maximum set point temperature.	U	48 (R/W)	°C	80	r13	15
r15	Heat cycle minimum set point temperature.	U	49 (R/W)	°C	r16	-40	25
r16	Heat cycle maximum set point temperature.	U	50 (R/W)	°C	80	r15	45

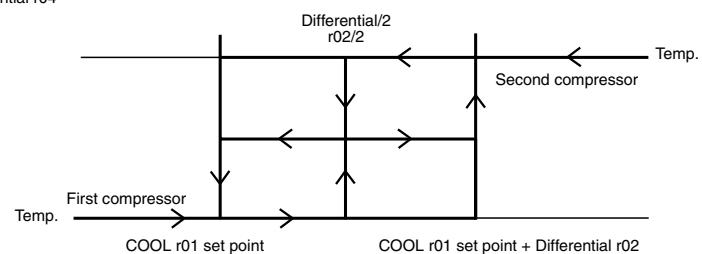
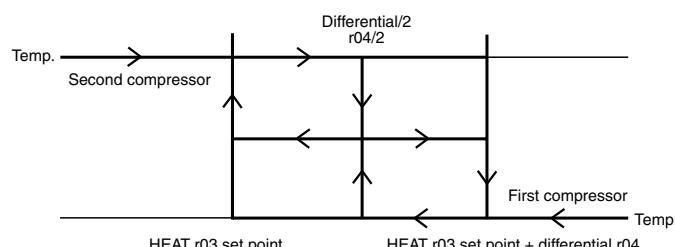


Table of alarms

Display	Alarm type	Reset
A1	Antifreeze alarm	Manual
AHt	High temp. at start-up (if activated, P20=1)	Automatic
ALt	Low temp. at start-up (if activated, P20=1)	Automatic
d1-2	Defrost in operation	-
dF1-2	Problem in defrost	Automatic
E1	Probe B1	Automatic
E2	Probe B2	Automatic
E3	Probe B3	Automatic
E4	Probe B4	Automatic
E7	Probe B7	Automatic
E8	Probe B8	Automatic
ELS	Low supply voltage	Automatic
EHS	High supply voltage	Automatic
EPr	Eeprom error. Unit in operation.	Automatic
EPb	Eeprom error. At start-up	Automatic
ESP	Communication failure with the expansion module	Automatic
EL 1-2	Problem at fan voltage control	Automatic
FL	Flow switch	Manual
Hc1/Hc2	Compressor maintenance alarm	Automatic
HP1/HP2	High pressure	Manual
HP1	Fan 1 thermal protection (TK1)	Manual
HP2	Fan 2 and 3 thermal protection (TK2 and TK3)	Manual
HT	High water temperature warning	Automatic
LP1/LP2	Low pressure	Manual
tC1	Compressor 1 thermal switch	Manual
tC2	Compressor 2 thermal switch	Manual
TP	Phase order failure/Phase failure	Manual

Reset of alarms

Pressing the UP and DOWN keys for 5 seconds cancels alarms present in the memory. At the same time, the alarm message disappears from the display and the alarm relay is deactivated.

Forced defrost (heat pumps)

Pressing the SEL and UP keys simultaneously for 5 seconds activates forced defrost of the unit.

Clearing hour counters

While reading compressor or pump (c10, c11 and c15) operating hours, said counters can be cleared by pressing the UP and DOWN keys simultaneously.

Pump operation

4 operating modes can be selected in accordance with the value given to parameter H5. H5=0 (pump disabled). H5=1 (pump always on), H5=2 (pump on controlled by the regulator or in parallel with the compressor), H5=3 (pump starts and stops at regular intervals, independent of compressor

operation) (parameters c17 and c18).

Calibration of probes

If necessary, probes can be calibrated by using parameters /13, /14, /15, /16, /19 and /20. See Parameters related to probes table.

Remote ON/OFF

A remote ON/OFF intake can be connected between terminals D5 and B of the connecting strip. To activate said intake, a value of 1 should be given to parameter H07 (H07=1). With this intake open the unit is OFF; when closed, the unit is ON. This function does not disable the ON/OFF function of the keyboard.

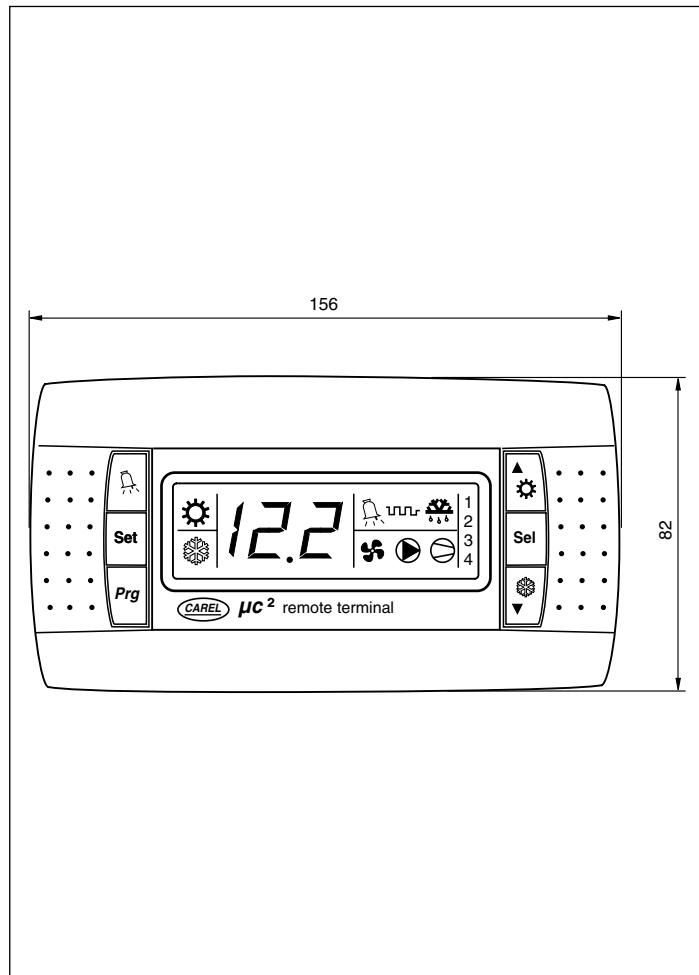
Remote COOL/HEAT

A remote COOL/HEAT intake can be connected between terminals D1 and B of the connecting strip. To activate said intake, a value of 1 should be given to parameter H06 (H06=1). With this intake open the unit is in HEAT; when closed, the unit is in COOL. This function does not disable the COOL/HEAT function of the keyboard.

Accessories

Remote terminal

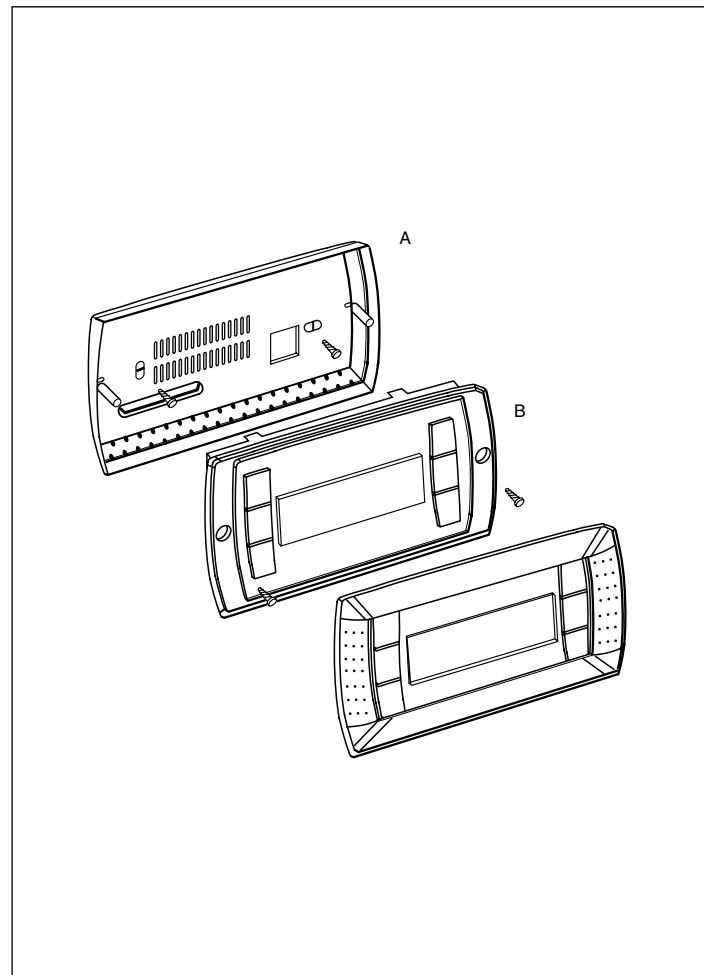
This accessory allows remote control and supervision of the air conditioning unit (up to 1040 m.). Functions are the same as the standard control panel keyboard. This remote terminal is compatible with said keyboard, and the air conditioning unit can be accessed from both devices. For this application, it must be connected to the system by means of the *serial line connection RS485 accessory*.



Wall-mounting

For wall-mounting, the rear support (A) must be fastened to a standard three-switch modular box.

- Fasten the rear of the casing to the box by means of the two round head screws.
- Connect the telephone cable.
- Lean the control unit on the rear casing and fasten by means of the two flat head screws (B).
- Fasten the front panel by applying slight pressure.



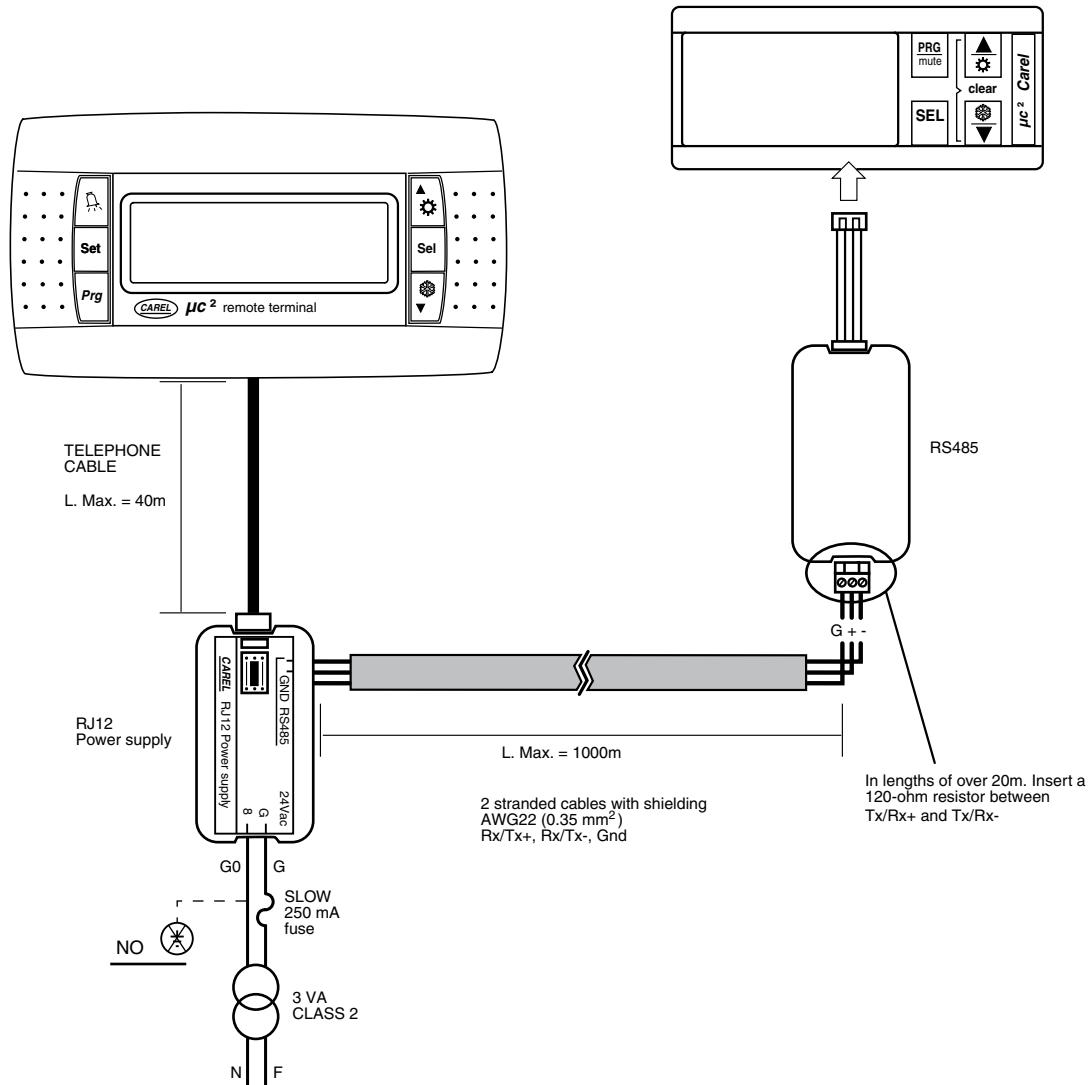
Wiring

Connect the RS485 serial device (separate accessory) to the RJ12 *power supply* outlet (included with the remote terminal) and to the electric panel keyboard supervising connection, by using shielded cable. Power terminals G-G0 by means of a transformer and a 250mA slow fuse as per the diagram enclosed. Carry out connection between *power supply* RJ12 and the remote terminal, using the telephone cable supplied (80 cms.). This cable can be replaced by a longer cable of up to a maximum of 40 m.

Attention:

- Use safety transformer only (3VA, class 2).
- For safety purposes, a 250mA slow fuse should be inserted in series with the G terminal.
- Do not ground transformer secondary.

Maximum distance to RS485	1 km. (insert a 120-ohm 1/4W resistor in RS485)
Speed	19.200 bauds
Cable characteristics	2 stranded cables with shielding
Cable section	AWG22 (0.35 mm ²)
Capacity per metre	>90pF/m (for example, BELDEN 8761-8762 cable)



Installation

No configuration is necessary for the remote terminal to be operative, because the terminal operates whatever the control serial direction might be (can be selected by means of parameter H10). At start-up, the screen will display the control version. After 4 seconds, all symbols will be displayed. Should the connection to the RS485 not be correct, or the control unit is set to OFF, the message offline is displayed.

Info mode

Pressing the up, down and sel keys simultaneously for over 6 seconds, four lines are displayed with information on the system and communications.

Line 1	Terminal version
Line 2	Control unit version
Line 3	Control supervision direction
Line 4	Error percentage between the terminal and the control unit

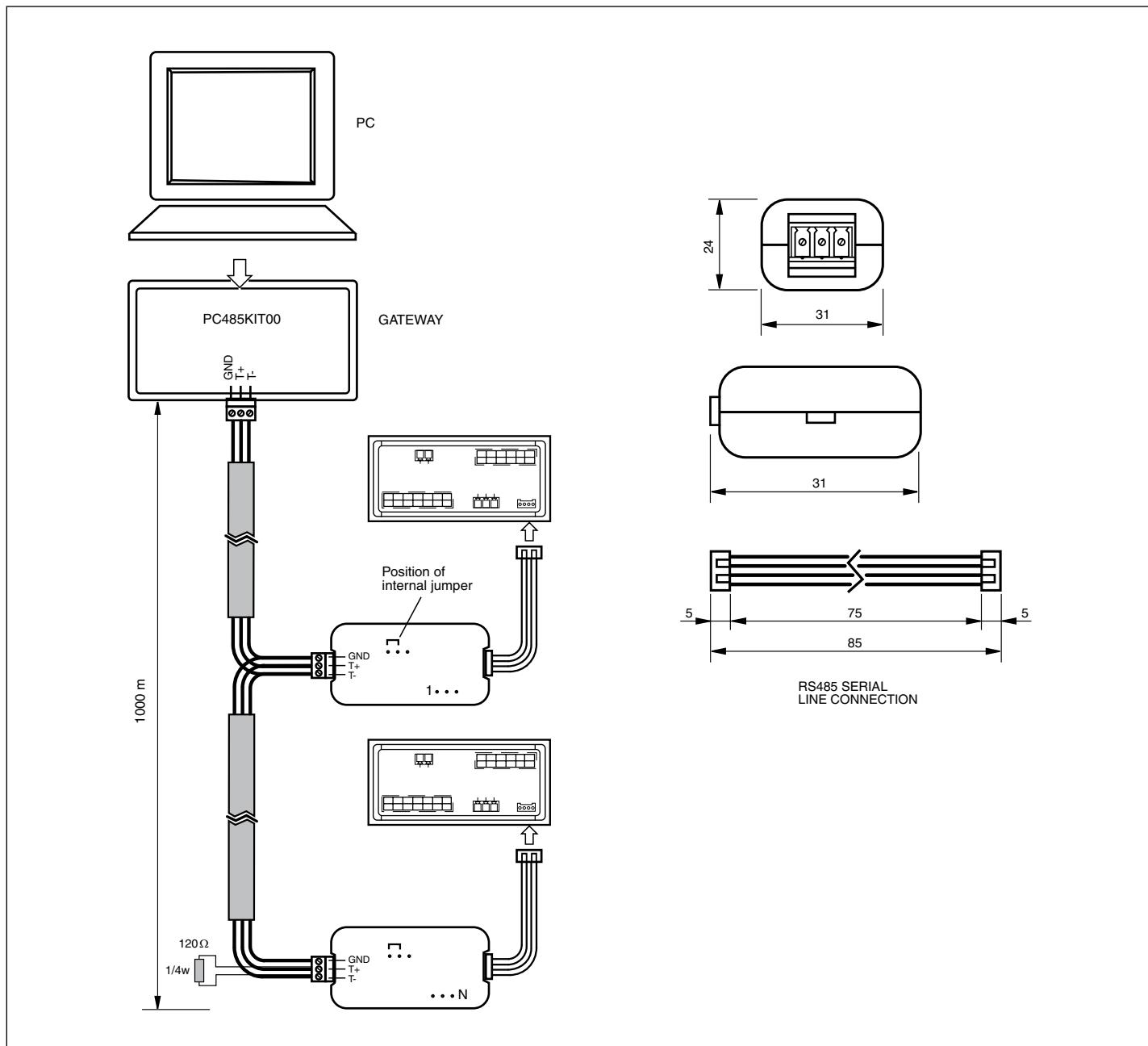
Connecting serial line RS485

This accessory allows connecting the air conditioning unit to a serial line RS485 supervision network. It must also be used to install the remote terminal accessory.

Mounting

Connect the accessory to the four-pole socket base at the lower right angle of the module with display and keyboard. Use the 4-cable connector supplied. Connect to the supervising system as indicated in the drawing below.

The series should be terminated by connecting a 120-ohm 1/4W resistor between terminals TxRx+ and TtxRx-.



Attention:

- Secure the device inside the electric panel so as to avoid accidental disconnection.
- Interconnect having turned power supply off first.
- Keep the serial connection cables away from the power supply cables.

Maximum distance supervision	1000 m. (insert a 120-ohm 1/4W resistor in the last RS485 connection)
Speed	19.200 bauds
Cable characteristics	2 stranded cables with shielding
Cable section	AWG22 (0.35 mm ²)

Low ambient temperature kit (ratiometric transducers)

Applicable only to cool only units to adjust the condensing pressure at a low ambient temperature (to -18° C).

Includes:

2 ratiometric pressure transducers.

2 Packard connectors.

2 three-way connectors.

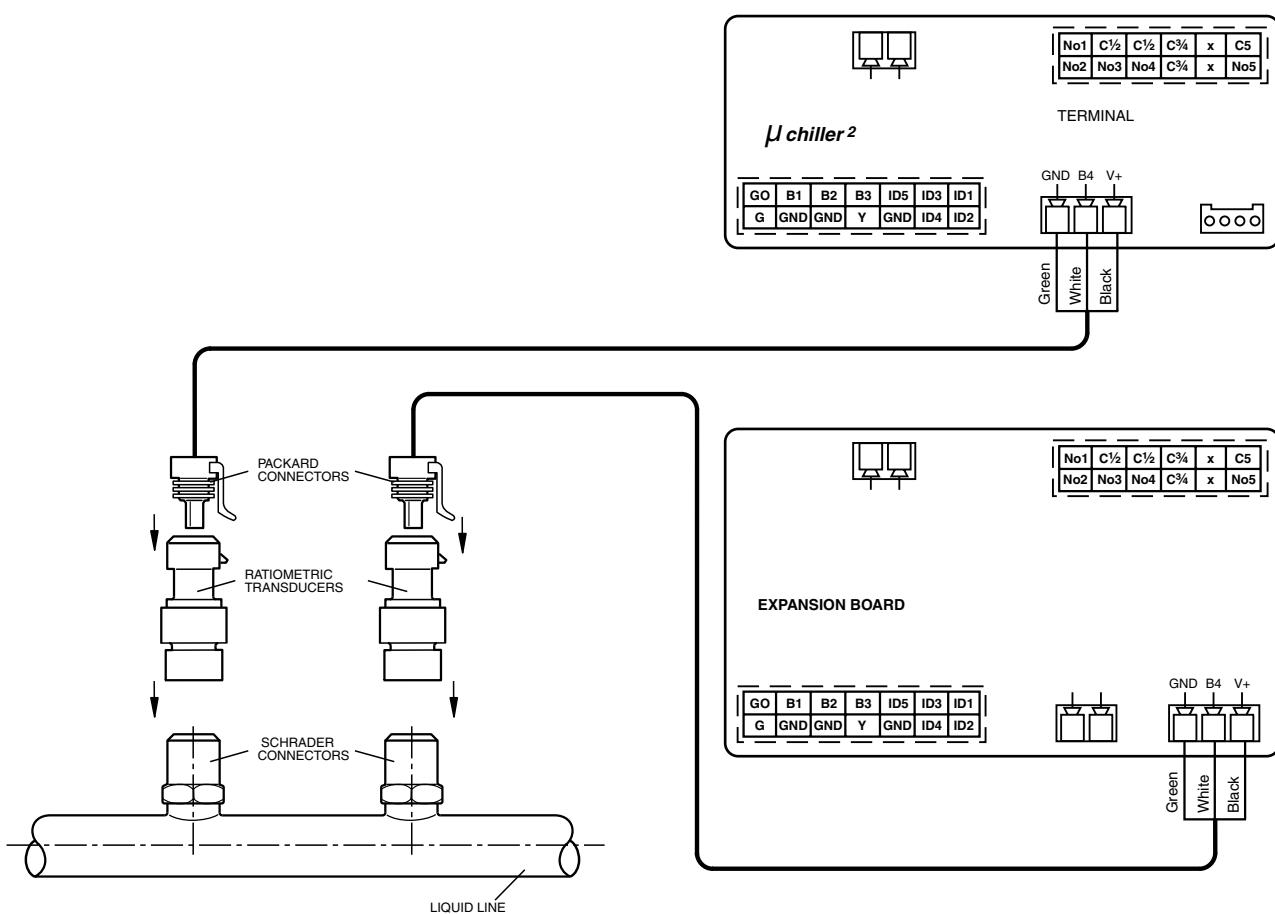
Attention: Install the kit with power supply to the unit turned off.

Mounting pressure transducers on the cooling circuit

Screw the two ratiometric transducers on to the two free Schrader valves located in the liquid line of the unit. Check for leaks.

Mounting the Packard connectors

Connect the three Packard connector cables to the two three-way connectors and at the two regulator modules as indicated below.



Disconnection of probes B3 and B7

Disconnect the terminals of probes B3 and B7 from the connecting strip to cancel them.

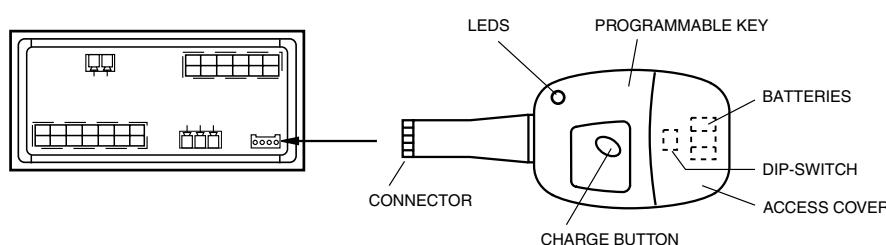
Modifying parameters

- Power the system.
 - Select standby on the regulator.
 - Enter the parameter programming system by means of the password.
 - Modify the following parameters in accordance with the values indicated: /03= 0; /04= 3; /07= 0; /08=3; F05= 13; F06= 3; F07= 5; P18= 30.3.
- Start the unit and check operation.

Programmable key

Allows up and downloading the operating program of the unit.

This can be carried out with the power supply to the unit off, as the key has internal batteries (3 1.5V 190mA Duracell D357H or equivalent batteries).



Downloading unit program to the key

- Remove the key cover and set the two dip switches to OFF. Replace the cover.
- Insert the end of the key (four-pole socket connector) on to the pin connector at the bottom right of the module with display and keyboard.
- Press the key button. The LED goes on in red. Once download is over, this LED turns green. Once this sequence is over, you can release the button and disconnect the key from the module.

Uploading program from the key to the unit

- Remove the key cover and set the two dip switches: dip switch 1 to OFF, dip switch 2 to ON. Replace the cover.
- Insert the end of the key (four-pole socket connector) on to the pin connector at the bottom right of the module with display and keyboard.
- Press the key button. The LED goes on in red. Once upload is over, this LED turns green. Once this sequence is over, you can release the button and disconnect the key from the module.

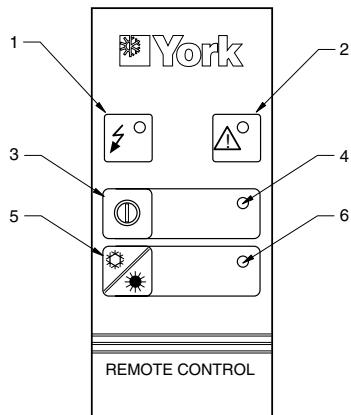
Messages of the LEDs

LED SIGNAL	ERROR	MEANING & SOLUTION
Red LED flashing	Batteries low at starting to copy	Replace batteries
Green LED flashing	Batteries low at end of copy	Replace batteries
Red/green LEDs flashing (orange signal)	Instrument not compatible	This can happen only when downloading the program. Check program on the key.
Red and green LEDs on	Copy error	Repeat operation. If this error persists, check batteries and key connection.
Red LED always on	Transmission error	Repeat operation. If this error persists, check batteries and key connection.
LEDs off	Batteries disconnected	Check batteries.

Remote control unit

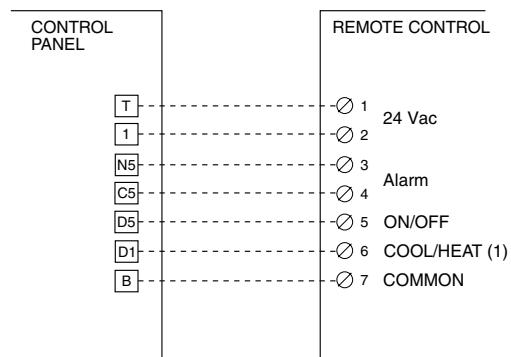
Wall-mounted, with keys for COOL/HEAT and ON/OFF functions. Includes voltage, alarm and COOL/HEAT LEDs. Prior to installation, value 1 must be given to parameters H06 and H07.

- 1- Voltage LED
- 2- Alarm LED
- 3- ON/OFF selection LED
- 4- Unit ON LED
- 5- COOL/HEAT selection LED
- 6- LED on in heat function/
LED off in cool function.



- The remote control unit can be located at a maximum distance of 50 m.
- Minimum cable section should be 0.35 mm².
- Avoid passing control cables near power supply cables.

Connection to control panel



(1) On heat pump units only

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